

✓ **Troubleshooting Tips For Software Lockups & Windows Startups**

Smart Computing

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IN PLAIN ENGLISH

December 1999 Vol. 10 Iss. 12 \$3.95 U.S. \$4.95 Canada

What's

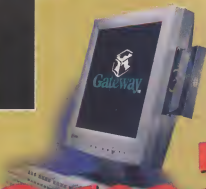
IN

What's

OUT

What's

Upcoming



**Snapshot
Summaries**
Of Today's
PC Trends

Inside Amazon.com

Contact Managers
Keep You In Touch
& On Time



**Easy Ways To Print
Web Material**

**Why You Can
Afford A
Laser Printer**



**What Basic
Programming
Can Teach You**

**Overviews
Of Which Products
To Buy, Avoid & Watch For**



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Focus On:

Industry Overview

General Computing

20 State Of The PC

In the fast-moving world of computer technology it's tough to follow the trends. These snapshot summaries provide practical reports on what's happening with key PC components.

- 21 Desktop PCs
- 23 Notebook PCs
- 24 PDAs
- 25 Operating Systems
- 26 Software
- 28 Processors
- 29 Displays
- 30 Removable Storage
- 31 Hard Drives
- 32 Modems
- 34 Input Devices
- 35 Sound & Video
- 37 Printers
- 38 Digital Cameras
- 39 Scanners

PC Operating Instructions

12 Windows 98 System Configuration Utility

Use this tool to solve hardware conflicts and configuration problems by gradually eliminating files at startup until you find the faulty one.

14 How To Compress Drives

Windows 98's DriveSpace tool is up to four times more efficient than Windows 95's when it comes to packing data onto your hard drive.

15 NT's Little Black Box

Windows NT features the handy Event Viewer, which lets you keep track of exactly what's happening with your system.

16 Basic Training

Topics covered this month: customizing mouse settings, adding password protection, using the PRINT SCREEN key.

PC Conversations

40 The Year 2000 Problem

Bruce Webster, a leading Year 2000 consultant, talks about the real-world effects computer problems are likely to have on average people at the beginning of next year.

Master The Web

44 Amazon.com's Tributaries

The well-known online book-seller's bargains now include much more than the printed page. Check here for deals on CDs, toys, electronics, and more.

47 Rest Your Feet At Shopping.com

Looking for the best in electronics and entertainment items? Check out this online collection of vendors.

50 Web Tips

Computing Basics

52 Curing The Web Printing Woes

Catch up on the latest ways to make printouts of Web pages look almost as good as the pages appear on-screen.





Office Computing

56 Contact Management

Toss that antiquated Rolodex because today's contact management software can help you keep track of your clients and build relationships in whole new ways.



Quick Studies

- 60 Microsoft Word 97:
Common Shortcut Keystrokes
- 61 WordPerfect 9.0:
An Overview Of What's New
- 62 Lotus 1-2-3
Millennium Edition:
Using View Menu Options
- 63 Going Online:
Watch & Listen
With RealPlayer G2
- 64 Microsoft Excel 97:
Using Range Names
- 66 Web Browsers:
Browsing Offline
With Internet Explorer 5
- 67 Quicken Deluxe 99:
Online Banking
- 68 PowerPoint 97:
Using The Picture Toolbar
- 69 Print Shop Deluxe:
Working With Graphics
In PressWriter
- 70 Microsoft Works 4.5:
Create & Use Charts

72 Quick Tips

Beyond The Basics

74 Programming From Ground Zero

Learning computer languages might sound tedious, but it can have big rewards for computer users of all levels.

Upgrading

78 Is It Time For A Laser Printer In Your Life?

Falling prices and increased quality make now a perfect time to give laser printers another look.

80 Hardware Reviews

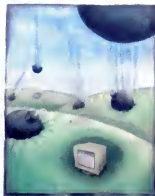
Desktop Systems:	
Compaq Presario 5714	80
Networking:	
ADS USB to Ethernet Networking Starter Kit	81
Video Cards:	
Winnov Videum AV	81
Monitors:	
Princeton Ultra 52B Monitor	82
Memory:	
Imation SuperDisk IDE Drive	82
Printers:	
Brother HL-1240	83
CD/DVD Drives:	
Current Leaders	83



Troubleshooting

84 Working Around The Bombs

Use these tips to get past the frustration of software errors and start finding solutions.



Tidbits

90 How Far We've Come

As we get ready to begin a new decade, it's time to look back at the past 10 years and mark technology's progress. Step through time to see the advances computers have made.

Each Month

- 6 Technology News
- 8 Notes
- 88 Find It Online
- 92 Q&A
- 99 Article Index
- 106 Action Editor
- 107 Glossary
- 108 Editorial Comment

Corrections/Clarifications:

Our November 1999 hardware review "One Huge Hard Drive" stated that IBM's 37 gigabyte Deskstar 37GP is the largest-capacity hard drive available for desktop computers. More accurately, at that writing it was the largest drive shipping in any new desktop PCs. Seagate offers a 50.1GB drive that can be used in desktop PCs.

November 1999's Q&A stated that Windows 98 and Windows 95 can install on an empty C: drive. Note that before reformatting (emptying) a drive you must provide for activating the CD-ROM drive afterwards in order to access the Windows installation CD. Reactivation is usually automatic using a Win98 Startup Disk, which you should make and test before reformatting. With Win95 you may have to contact your CD-ROM drive maker for drivers and directions on reactivation. If the copy of Windows you intend to reinstall is an "upgrade" version it may insist on proof of ownership of an older version of Windows (by insertion of the older CD-ROM or older installation diskettes) before it will agree to re-install on an empty drive.

The BeOS operating system does not run 64-bit applications, as reported in "Microsoft Alternatives" in the November 1999 issue. BeOS does, however, have a 64-bit file system.



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Tip Of The Month: *Hardware Award Winners*—In each quarterly *Guide To Buying Computers* we test and compare the latest hardware products. We give awards to those products in each subcategory that provide the most value for the money (Best Value) and perform the best in testing (Best Performance). We also select one product across the entire category as our Overall Favorite. Now you can quickly see which products earned our awards by accessing the Hardware Award Winners under the Find Products section of the Smart Computing home page. Here you will find a list of the award-winning products, as well as links to the charts and reviews in which they appeared.

Upcoming Special PC Novice/ Smart Computing Issues Available On Newsstands ...

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Learning Series: Web's Best Shopping & Auction Sites

The ultimate resource for helping you buy everything you need online.

Reference Series: How Computers Work

Plain-English explanations and diagrams showing how technological processes work.

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INTERACTIVE EDITION

The Spread Of Linux

Although open-source code Linux has made a name for itself on server environments around the world, the free operating system (OS) hasn't been considered as a serious substitute for Windows on desktops until recently. Linux claims 17% of new server environment shipments after an explosive 212% growth rate in 1998, according to the market researcher International Data Corp. (<http://www.idc.com>), and industry giants began to take notice, reconsidering the "always Windows" mentality.

Corel, Dell, Hewlett-Packard, IBM, Intel, and others now offer support services for systems running Linux. Burlington Coat Factory Warehouse Corp. recently announced its plans to implement Linux-based systems at its offices nationwide, and Gateway installs the free OS by request on selected servers.

According to Chris DiBona of Linux Systems, a support provider for the OS, the "severe blow" Linux dealt Microsoft in the server market is a precursor of bigger and better things

to come. Although Linux has yet to make significant gains in the desktop arena, DiBona says, it should begin appearing on new personal computers in the next year and a half.

That statement appears to be more than just wishful thinking. A recent IDC study revealed that about half of the organizations queried plan to delay their launch of the coming Windows 2000 release because of fears about its stability. This could be good news for Linux; of the respondents, 13% already use Linux, and other organizations may turn to the operating system, noted for its stability, as an alternative.

"Microsoft provided a popular desktop platform," DiBona says, "but they did not provide a reliable one." Users lost documents because the OS wasn't up to the task of running the system reliably, she says. Linux is.

Linux is branching out from the server OS market into the e-commerce arena as well. Several software makers, such as Magic Software and OpenSales, are releasing various



applications for online business solutions. With IBM's Linux-based Netfinity and Oracle's WebDB, both companies have jumped on the Linux-based e-commerce bandwagon, and Hewlett-Packard is planning to use Linux in its new E-speak Internet services.

Right now the effect of Linux on desktop computers may seem negligible. DiBona and other industry experts insist, however, that it will affect everyone eventually as software manufacturers notice Linux's presence in the desktop market and create more Linux compatible applications and services.

Linux won in the server market, because, according to DiBona, "Web servers run flawlessly and reliably on it, and this is where the OS is being used most effectively right now." Managing file servers for Windows clients is easier for information technology professionals running Linux

because it's reliable, easy to manipulate, and easy to customize.

"The average user may already be using [Linux]," DiBona says, even if only indirectly through network and e-commerce connections. The move to the desktop is only a matter of time. ■

PC Purchases Leveling Off

According to market analyst Forrester Research, almost 40% of all homes in the United States have a computer. Although that number is expected to increase, Forrester officials say that growth rate will not be as high in the next five years because of market saturation and stable computer prices.



A Different Kind Of Web Access

Advances in technology and a market push to make e-commerce accessible to people who don't own computers has triggered an explosion of products designed to take the Internet out of the PC.

Your daily encounter with the Internet may soon begin at the gas pump when Tokheim Corp. launches its Internet-ready devices in early 2000. The gas pumps, powered by Microsoft Windows CE, have small screens for viewing the Web. Tokheim officials say consumers will be able to check weather and traffic conditions and, eventually, make hotel reservations. From the gas pump, you'll be able to order products from a nearby convenience store, which would have the items ready at a drive-through window.

Even one of the most established communication devices, the pager, hasn't escaped the scramble to provide

alternatives for Internet access. Using a service called OnTheGoInfo, Motorola's iKno! customers can now receive customizable content covering everything from health tips to international news. And Arch Communications Group is working with Datalink.net to send news, entertainment, sports, weather, and other online information to pagers.

But the real invasion is into the home, with several products aimed at taking advantage of "smart" houses, which are equipped with built-in Internet communication capabilities.

The Ariston Digital Oven, for example, has a modem and connects to an online recipe database to adjust its



temperature according to the cooking instructions. And the new Electrolux refrigerator features a built-in PC on the door and a modem for connecting to the Internet. The fridge monitors its food supply and orders more from online grocers. Company of-

ficials say eventually the refrigerator could provide non-food services, such as online banking.

Even manufacturers of gaming devices are getting into the act. Nintendo announced plans for a Game Boy that connects to digital cell phones for Internet access. With the device, users download games, exchange e-mail, join chat rooms, and play with other players online. Sega has already released its Internet-ready game console, the Dreamcast, which features a built-in modem. ■

Tech Shorts

A NEW PRODUCT on the e-mail security front, Ion1 Lite, includes a self-destruct feature and a \$50,000 prize for anyone who can hack into the application's 2,048-bit encryption security. From Global Market Ltd., Ion1 Lite guarantees confidentiality and offers an autoshrredder, which leaves no trace of sent messages, prevents recipients from cutting and pasting parts of the message, and overwrites deleted information on the hard disk. Company officials also claim the new service prevents all spam messages and that its high level of encryption makes hacking nearly impossible. Others, primarily makers of alternative e-mail security products, dismiss the new application as hype and point out that poor password choice is what leaves users vulnerable to probing eyes.

Even the dust in the air could one day contain tiny computer chips.

Researchers at the Berkeley Sensor and Actuator Center in California have created a cubic-inch machine. It contains sensors to measure weather conditions and can communicate with devices as far as 13 miles away. Motes, or microelectromechanical systems (MEMS), are produced using the same manufacturing techniques that are used to make integrated circuits for computer chips. So far, the smallest motes produced are about 5 millimeters, but the real goal of the project is to shrink them to 1 cubic millimeter. Several applications would be possible with the dust-sized computers, including communication among packages, warehouses, trucks, and palettes. With motes attached to your finger tips, you could type with your fingers in mid-air as the devices transmit the movements to a

computer where the data would be translated into text.

A venture capital company, "In-Q-It," created by \$28 million in seed money from the Central Intelligence Agency's classified budget, is on a mission to fund research and develop cutting-edge systems and gadgets. The non-profit organization, called "In-Q-It" after Major Boothroyd (known simply as "Q" to James Bond fans) hopes to make sure the CIA doesn't get left behind in the rapidly changing, cutthroat technology field. In-Q-It aims to keep our nation's spies equipped with the latest and greatest gadgets and devices by providing funding for Silicon Valley companies that are working on projects involving the Internet, computer security and privacy, data mining technology, and other areas. ■

Web-Wide Searches With One Tool

Using a single search engine to locate information on the World Wide Web is like visiting one library to find a specific book. If the book is popular, the library probably has a copy of it. But if the book is not well-known, you might have to expand your search to other libraries. Similarly, you'll probably need to use several search engines if you want to find an obscure piece of data on the Web. Fortunately, Copernic 99 Plus provides an easier way to do this.

Rather than visiting the search engines one at a time, use Copernic 99 Plus for access to more than 125 search engines. Copernic 99 Plus presents 23 categories, such as The Web, E-mail Addresses, Newsgroups, Tech Reviews, Top News, and Jobs. It

previews as many as 300 results from each engine before it queries and presents its findings in a hierarchical ranking of relevant sites. You can save the search results in several formats, including plain-text and Hypertext Markup Language (HTML). Copernic 99 Plus retains a history of your searches, as well, so you can review the results of a recent search quickly and conveniently.

We found Copernic 99 Plus to be an intuitive and robust search tool that presented much better results than what we were accustomed to receiving from our regular



search engine. The handy Search Wizard made it easy to perform both basic and advanced searches. Each search with Copernic 99 Plus took much longer than a similar search on Yahoo!, Lycos, or Excite, but the quality of the search results more than made up for the extra search time.

The only complaint we had with Copernic 99 Plus was that it didn't integrate with our Web browser. Using the search tool meant opening yet another window on our overly cluttered Desktop. This is not a problem unique to Copernic 99 Plus, however; many programs share this affliction.

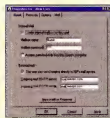
Copernic 99 Plus is available for downloading at the Copernic Technologies Web site. It costs \$29.95 and currently comes in three versions: English, Japanese, and French. A trimmed-down version of the product is also available for free at the site.

Get Smart About Interest Rates

Calculating the interest payments on a loan is never fun, but it can be easy when you use the Simple Loan Calculator from WorldStart. This intuitive shareware application not only allows you to calculate the principal, length, and payment amounts for any loan, it also lets you create a printable record of loan information and simultaneously compare the terms of three similar loans.

The best feature of this application is its loan comparison function, which you won't find on similar Web-based calculators. We used this feature to determine the best deal on a car loan. It allowed us to see how different interest rates, repayment periods, and principal amounts would

The side-by-side loan comparison function of Simple Loan Calculator is its best feature.



affect our monthly payments. When we went to the car dealership, we knew which financing option was the best for us.

You can download the Simple Loan Calculator for a 60-day free trial period. If you decide to keep it, you can register the product for \$8.95.

WorldStart

Simple Loan Calculator
(888) 557-2558
<http://www.worldstart.com>

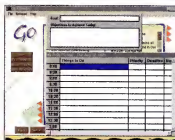
Copernic Technologies

Copernic 99 Plus
(418) 527-0528
<http://www.copernic.com>

Organize & Prioritize Yourself

Being organized isn't merely a physical condition; it's a state of mind. Unfortunately, the ability to size up a situation, set priorities, and put everything in its place does not come easily to everyone. Get Organized, an instructional program from JIAN Tools for Sales Inc., offers to help individuals who need more order in their lives.

The Get Organized CD-ROM guides you through 24 lessons for achieving an organized mindset. The lessons, which cover such tasks as



Get Organized's built-in Daily Planner is just one of the tools you can use to bring order into your life.

setting goals, determining priorities, coping with unexpected changes, and making decisions, complement the

Get Organized textbook that accompanies the CD-ROM. The program also provides 20 worksheets that help you set up a weekly time budget, create a goal statement, devise a priority pie chart, and assess your strengths and weaknesses. Get Organized keeps track of each lesson and worksheet you complete so you don't waste time on redundant information.

We liked Get Organized. Instead of merely presenting

a series of organizational dos and don'ts, the program focuses on the core issues of organization: priorities, time management, and goal-setting—just to name a few. And unlike a book, which is a rather staid learning format, the interactive nature of a CD-ROM makes it easier to comprehend the materials and put them into action. For \$39.95, this is a tool that will justify its cost in no time.

JIAN Tools for Sales Inc.

Get Organized
(800) 346-5426
(650) 254-5600
<http://www.jian.com>

One Online Connection, Multiple Users

For many individuals and businesses today, Internet access is as necessary as a telephone. But outfitting every desktop in a small office or personal computer network with a separate Internet connection can be an expensive proposition. MidPoint Gold, an e-mail management and Internet-sharing application from MidCore Software, may provide the cost-effective solution that you need to address this dilemma.

MidPoint Gold allows multiple users on a network to share a single Internet connection. Users can run their own browsers and maintain their own private e-mail accounts on the shared connection. The program works with every type of Internet connection, including analog modems, cable modems, Digital Subscriber Line (DSL) routers,

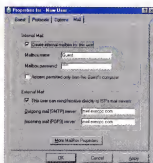
and Integrated Services Digital Network (ISDN) connections. It even supports modem teaming, a method which harnesses the collective bandwidth of several modems for faster Internet access.

MidPoint Gold stands out from the competition for a few reasons. First, its powerful E-mail Broker feature lets you create and maintain several private e-mail inboxes via one e-mail address. Then, when MidPoint Gold detects an incoming message, its filter delivers the message to the appropriate inbox.

Secondly, MidPoint Gold provides a shared cache that stores a copy of all Web pages visited by anyone on the network. When a network user wants to access a page that someone else recently accessed, MidPoint Gold directs the user's browser to

the cached copy. This reduces the amount of "wait time" frequently associated with Internet sharing programs.

Finally, MidPoint Gold has helpful download features. Download Doubler works with the program's modem-teaming capabilities to expedite the download process by splitting the transmission between two connection points. FailSafe Download automatically restarts interrupted downloads where they dropped off so that you don't lose data or time.



MidPoint Gold allows you to set up multiple private mailboxes, a handy feature when several users share a common e-mail address.

On the downside, MidPoint Gold took much longer than we thought it should to install and configure on our network (which consisted of a pair of computers connected by a serial cable). Configuration is not intuitive, nor is it guided by a configuration wizard. The users manual is a .PDF file, which meant we repeatedly had to toggle back and forth between Adobe Acrobat and MidPoint Gold while we read it. We understand that electronic documentation saves money on the front end, but a hard copy manual often saves valuable setup time.

MidPoint Gold is available in many X-user versions and runs on any PC with Windows 95, Windows 98, or Windows NT 4.0. The five-user version sells for \$399.

MidCore Software Inc.

MidPoint Gold
(800) 673-6274
(203) 577-5370
<http://www.midpoint.com>

Stuff For Your Stocking

We're still not sure about the existence of Santa Claus, but we know for certain that there's no such thing as a computer user who has everything. If, however, you know anyone who might be close to earning that distinction, consider giving that person one of these gifts.

Fix Scratched Discs

The GameDoctor from Digital Innovations professes to clean your scratched and damaged compact discs, including audio CDs, CD-ROMs, and DVDs. We found that it actually works pretty well, although it can't perform miracles.

We tested the GameDoctor on two damaged audio CDs. One CD had minor scratches and surface imperfections; the other was heavily damaged with deep scratches that prevented us from listening to several tracks on the disc. After using GameDoctor, the minor scratches and surface imperfections vanished from the first CD, and it played perfectly. The heavily damaged disc, on the other hand, was not repaired completely; several songs remained unplayable, even after a double cleaning. But we were able to listen to a few tracks that had previously been off-limits due to disc damage, and considering the size of the scratches on this disc, we were impressed that GameDoctor could save these songs.

GameDoctor, like Digital Innovations' other

disc-cleaning products, carries a suggested retail price of less than \$35.

Digital Innovations

GameDoctor
(888) 762-7858
(847) 467-2309
<http://www.digitalinnovations.com>

Tidy Up Your Desktop

Do you wish that you had a bulletin board in easy reach of your PC screen? Look no further than the EEGO Desktop Environment, a computer monitor attachment from Allmedia Inc. The EEGO device fits around your monitor screen and provides a pair of corkboards on either side, as well as a dry-erase board at the top. By using it, you'll always have a place to tack a note or write an important number.

We'll admit that the EEGO looks a bit goofy, isn't compatible with most glare guards, and only fits 15-inch monitors (although a 17-inch version will be available soon). It's also huge—a full 18 inches by 24 inches. But once we got the EEGO attached to our monitor, we found it to be unobtrusive and more helpful than we thought it would be. For



less than \$25, this might be a useful gadget to consider using rather than putting sticky notes on your monitor. It comes in four colors: black, red, blue, and yellow.

Allmedia Inc.

EEGO Desktop Environment
(800) 553-4742
(204) 794-6234
<http://www.eegomania.com>

Close Reflections

Whether checking for spinach between your teeth, trying to get an eyelash out of your eye, or watching for snoops who want to see what's on your computer monitor, you sometimes need a mirror. With the PC Mirror, you can have one at your desk all the time.

This 4-inch by 4-inch plastic mirror connects to

the side of any computer monitor. When it's open, it looks like a side mirror on a car and can be adjusted easily for better viewing. When you're not using it, the mirror folds back against the side of the monitor. PC Mirror costs \$9.95, and you can have it customized with your business logo.

Assist Technologies Inc.

PC Mirror
(800) 655-2911
(914) 228-1457
<http://www.pcmirror.com>

Diskette Storage

The 3.5-inch diskette has been a ubiquitous part of the PC environment for more than a decade, and yet people are still trying to devise a better way to keep track of them. One of the latest attempts at organizing these diskettes is the Diskits Desktop Diskkeeper. This colorful foam sculpture holds 25 diskettes, costs less than \$16, and is available in six styles, including a mailbox, a shark, and a New York City skyline.

What we liked most about the Diskits, compared to other diskette organizers we've seen, is its soft construction. It won't scratch your desk, and if it's accidentally knocked onto the floor, it won't break.

Compufun

Diskits Desktop Diskkeeper
(888) 266-7836
(903) 753-3259
<http://www.compufun1.com>

Hardware

You can dramatically boost the speeds for data transfer between your handheld peripherals and your portable or desktop machine using the Flashgate CompactFlash Reader/Writer USB from Hagiwara. With speeds 60 to 160 times as fast as normal serial connections, the \$85 reader/writer can transfer data from a peripheral, such as a digital camera or voice recorder, using Type 1 CompactFlash cards to a desktop or portable PC. Because it's a Universal Serial Bus (USB) device and doesn't need a separate power supply, you can usually hot swap it with a compatible PC running Windows 98 (Win98), (800/358-7267, 619/546-9989; <http://www.hscus.com>). ▶ It's time to trade in that bulky desktop computer for a sleek DeskNote notebook from Eurocom Corp. The 8500C or 3100C, Eurocom's high-end answers to portable



Eurocom
DeskNote 8500C

computing, feature several upgrading options, including a 24X CD-ROM drive upgradeable to a 4X DVD drive. With a base price of \$2,200, the 8500C DeskNote weighs 9.5 pounds and has a 15.1-inch active matrix display and a 6.4 gigabyte (GB) removable hard drive. Options, which will increase the cost, include up to 384 megabytes (MB) of RAM, 8MB of video RAM, and a removable diskette drive that you can swap for a Zip drive. For \$1,999, the 3100C

DeskNote weighs 6.6 pounds and has a 6.4GB hard drive, 14.1-inch active matrix display, and Corel's WordPerfect Office Suite 2000. Upgrade options for the 3100C include up to 256MB of RAM, 8MB of video RAM, and a diskette drive you can replace with a higher-capacity LS-120 drive (613/224-6122, 905/282-9744; <http://www.eurocom.ca>).

▶ The new Stowaway keyboard from startup company Think Outside lets you input data to your handheld computer as you would with a full-sized keyboard. The size of a handheld device when folded, the 8-ounce Stowaway opens into a fully functional 69-key, QWERTY keyboard and offers the same key spacing and tactile feel of a regular desktop board. Connect your Palm or Handspring to Stowaway's docking station and begin typing; the handheld devices attach upright for easy viewing. The keyboard has several function and command keys and operates with most handheld operating systems that support text input. Due for release in late 1999, the Stowaway will sell for around \$99 (858/793-2900; <http://www.thinkoutside.com>).

Software & Services

You can view and manipulate zipped documents before unzipping them using ZipMagic 2000 from Ontrack Data International. Compatible with Windows 95, 98, NT, and 2000, the new \$40 version scans zipped files for viruses and lets you view some graphics, stop and resume a download from the Internet, and split self-extracting zip files. New wizards in ZipMagic 2000 let you automatically Zip and attach files to e-mail messages and Zip computer backup "sets" of predetermined sized files and folders. You can schedule multiple, concurrent download sessions from the Web or work in the DOS box in Windows to password protect and update information contained in zipped files (800/872-2599, 612/937-5161; <http://www.ontrack.com>). ▶ Active

Shield, the newest antivirus component of McAfee's online, subscription-based service, Clinic, provides continuous protection from viruses whether you're downloading files from the Internet, opening e-mail messages, or working on system files. ActiveShield monitors all system data input and output for viruses and prompts you to clean or delete an infected file or e-mail before opening it. The service alerts you to the latest viruses and threats, and it sends information about the newest updates for all of Clinic's components and how to get them. You can sign up for a 14-day free trial of Clinic or subscribe for a year for \$49.95 (877/622-3331, 408/988-3832;

<http://www.mcafee.com/centers/clinic>).

▶ Make sure the next person you hire to work with Microsoft Office 2000 products can perform as advertised using



ZipMagic 2000 from
Ontrack Data

Prove It! A software testing program from Know It All Inc., Prove It! Tests users' skill levels on Microsoft Office 2000 applications. The \$700 Prove It! 2000 package contains standardized tests designed to ensure an applicant's knowledge of Word, Excel, and PowerPoint. (Individual test software can be purchased for \$250 each.) Testers must complete a series of tasks aimed at simulating real-life situations using the soft-

ware. Prove It! conducts the test automatically, saves the results, and prints out a hard copy for you to review and compare with other test scores (800/935-6694, 215/546-7330; <http://www.knowitallinc.com>).

System Configuration Utility

You don't necessarily need to be a computer expert to seek out and fix whatever it is that's causing your system to falter. The System Configuration Utility (SCU) in Windows 98 is a one-stop utility with which you can view your system's startup files to find and fix problems by a process of elimination.

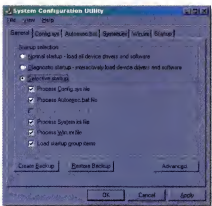
To access SCU, go to Start, Programs, Accessories, System Tools, and select the System Information option from the list of features. Here you should see your system information (what operating system you're running, the amount of free system resources, etc.) From the menu bar in the Microsoft System Information window, go to Tools and click System Configuration Utility.

Select the General tab, and you should see the Startup Selection for your system. Unless you've made changes, the Normal Startup radio button should be selected. Other tabs in the SCU are Config.sys, Autoexec.bat, System.ini, Win.ini, and Startup. Click any of these tabs, and you'll see the files with checked boxes to the left of them, which indicate these files are included in the system startup. From the Startup tab, you'll see a complete list of the applications and files that are loaded during startup. To remove a file from startup, deselect it by clicking the checkbox.

Note that some computers have two sets of Config.sys and Autoexec.bat files. One of these files may show up, but it's used for backward compatibility for older DOS and Windows applications, not to load your system's programs and execute commands when you boot up your computer. To edit your computer's main Config.sys and Autoexec.bat files, you should use Windows Notepad.

When you're ready to begin troubleshooting, go to the General tab. You'll see a Create Backup button at the bottom of the SCU box; you'll want to create a backup. If your troubleshooting didn't go as planned, click the Restore Backup button to restore your original Startup and system files.

Notice the three startup options, Normal, Diagnostic, and Selective, on



The Win98 System Configuration Utility lets you choose which program components to include when your system reboots.

the General tab window; there are also process commands for each of the system files in the SCU. These files and the components in the Startup menu are loaded during a normal startup. Click Selective startup and click the checkboxes for the process commands to eliminate them and click OK. When Windows prompts you to restart your computer, click Yes. When Win98 restarts, among other differences, you'll notice the monitor is reset to a resolution of 640 x 480 and a setting of 16 colors.

The ultimate goal of this troubleshooting session is to pinpoint which file is causing problems by eliminating possible offenders. Go back to General tab in SCU, and select one of the process commands. Click

OK and let Windows reboot your system. Continue to select one process command at a time and reboot until you see the problem again. Once see it, you've isolated the file in which you should continue troubleshooting.

Once you've discovered which file is causing the problem, go to its tab in SCU, such as System.ini. You'll see a list of code lines and commands. Still using Selective Startup, deselect the process commands one by one and reboot your computer. Repeat these steps with the other commands until you isolate the problem.

If the problem persists during a Selective start in which there are no process commands selected, the system's malfunction is being caused by something other than the startup files. Choose the Diagnostic Startup, which lets you check the device drivers that are loaded at startup. You'll want to see if the problem lies in one of the .VXD files, which are the files with the customized configuration of all of your hardware.

After rebooting, you'll see a DOS menu. Select Step-by-Step Confirmation and press ENTER. You'll see a series of files and prompts to press Y or N for each file. Press N for all files with a .VXD extension and see if the problem persists when Win98 reloads.

Once you've found the source of the problem, you can disable the malfunctioning line or reload the device driver. However, if this causes other glitches, you should contact a system administrator or tech support professional. Of course, as long as you're an experienced user, you can edit the lines of code yourself.

For many computer problems, the SCU lets you pinpoint the location of the offending file or line of code and saves a little time if you eventually have to explain the malfunction to a computer professional. ■

by Lori Robison

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How To Compress Hard Drives

One of the best subtle changes between Windows 95 and 98 is the inclusion of DriveSpace 3 with Win98. You won't see major ornamental changes over Win95's DriveSpace 2, but DriveSpace 3 greatly improves your compressed drive's ability to hold data.

DriveSpace 3 can be up to four times more efficient at compressing hard drive space than DriveSpace 2.

Before compressing your hard drive, note two potential problems. First, hard drives that have been converted to FAT32, Win98's file allocation table (FAT), cannot be compressed using DriveSpace 3. Second, any files compressed using DriveSpace 3 can be read only by other Win98 computers using DriveSpace 3.

Begin Compression

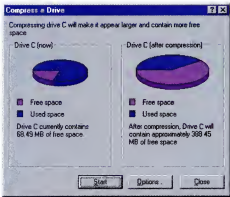
To open DriveSpace 3, click the Start button, the Programs option, then Accessories, System Tools, and the DriveSpace command.

If you don't see the DriveSpace command, don't worry. In many instances, DriveSpace 3 isn't automatically installed when Win98 is installed. To install it now, insert your Win98 CD-ROM and click the Start button, Settings, and Control Panel. Double-click the Add/Remove Programs icon. Next, click the Windows Setup tab and the System Tools listing in the Components section. Then, click the Details button. Place a check mark in the Disk Compression Tools box and click OK. Click OK again, and Win98 will install DriveSpace 3. You'll need about two megabytes (MB) of free hard drive space.

In the DriveSpace 3 window, you'll see representations of any hard drives and diskette drives currently

installed on your computer. (NOTE: DriveSpace 3 also can be used to compress diskettes.) Click the drive you want to compress.

You have two common hard drive compression options: Compressing the entire selected drive or compressing all or some of the free space on your existing drive.



The drive compression window tells you how compression will affect your available storage space.

If you compress the entire drive, all existing files on the drive also will be compressed. This method gives you the most additional hard drive space, but it may slow down your computer's performance. Click the Compress command under the Drive menu. In the Compress A Drive window, you'll see a graphical comparison of your drive's current free space compared with the free space you'll have after compression.

If you choose to compress only the free space on your current drive, click the Advanced menu and the Create Empty command. In the Create New Compressed Drive window, you can enter information into any of the five fields to choose the letter for the new drive, or to choose how much free

space will be created. As you change the numbers in one field, the numbers in the other fields may change to reflect your choices. If you accept the numbers suggested by DriveSpace 3, all of the free space on your hard drive will be compressed.

In either window, once the settings match your preferences, click the Start button. You may be prompted to update your Win98 Startup diskette. If so, insert a diskette into your diskette drive and click OK. You'll be told that you can no longer uninstall Win98. Click Yes if you want to continue.

DriveSpace 3 will check your hard drive for errors, which could be a lengthy process, depending on the size of your hard drive. If any are found, the compression process will be aborted until the errors are fixed.

After your drive is checked, you may be prompted as to whether you want to back up your files before beginning compression. If you haven't performed a backup, click Back Up Files and follow the directions. With your backup complete, click Compress Now to begin the process. Upon completion, you may be asked to restart your computer. If you've chosen to compress free space, DriveSpace 3 will create a new drive and assign it the new drive letter you chose earlier.

It's Not Perfect

Compression can be a helpful solution for a space-challenged hard drive. But it's not perfect, thanks to system slowdowns. However, the advantage—more hard drive storage space—will outweigh the drawbacks for many users. DriveSpace 3 can support hard drives up to two gigabytes (GB), which is four times larger than was supported with DriveSpace 2. DriveSpace 3 gives you plenty of control over the compression process and makes gaining additional storage as easy as it's ever been. ■

by Kyle Schurman

NT's Little Black Box

Windows NT users can open the Event Viewer to see what exactly went wrong in much the same way puzzled experts study the little black box to explain a plane crash. Microsoft developed the Event Viewer within Windows NT to record key system, security, and application events. Users can analyze these event logs to study and track a PC's events, and if a PC runs into trouble, users can find out why.

The Event Viewer automatically takes note of important system activity, such as crashes, updates, and device glitches. You can view these notes by clicking the Start menu, selecting Programs, heading for Administrative Tools (Common), and clicking Event Viewer. Double-click on individual events to read more descriptive details about what they mean.

Icons

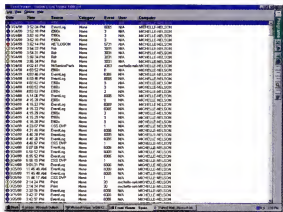
The main eye-catchers in the Event Viewer are the three icons on the left side of log events. The blue circle indicates an information log showing successful operations of major server services, such as when the Event log begins and ends recording information. The yellow warning icon means the user should watch out for possible errors in the future, such as when a hard drive is running out of space. The red stop sign equals an error, such as when a computer was powered off without being properly shut down.

Types Of Logs

There are three kinds of event logs: System, Security, and Application. You can view each one by selecting its name within the Log menu. The System log shows operating system

and hardware events, such as system crashes. This log also records internal events or drivers that don't start.

The Security log records audited events and security abnormalities. It shows either a Success Audit with a yellow key icon or a Failure Audit with



The Event Viewer log monitors your computer's events. It logs each occurrence as an information, warning, or error event with a colored icon.



The Find dialog box within the Event Viewer helps the user locate a specific event.

a padlock picture. The Failure Audit means a security access attempt failed. This usually occurs when someone tries to open a file without having permission to access it.

Application logs record application events and errors. If an application attempts an action that WinNT won't allow, the Event Viewer will record the failed attempt.

Altering Event Viewer Settings

There are many ways you can customize and organize your log files

within the Event Viewer. To archive logs, open the Log menu, select Save As, and save the log as if you were saving any other document. Be sure the Save As Type section indicates the file extension .EVT, so you can open the file within the Event Viewer for later analysis. To open an archived log, click Open from the Log menu and select the correct log.

After you have archived the logs, feel free to clear the Event Viewer to make room for new records. Select either the current System, Security, or Application log from the Log menu. Now click Clear All Events from the Log menu. Upon erasing the log file, you will only clear the currently open log view, either the System, security, or Application log.

To search for an event within a log file, click View, Find, and fill in the information you know about that event. This may include items such as the type of event or any text included in it. Now click Find Next to see the first occurrence of that event. Press F3 to find the next like event, and repeat until you reach the end of the log.

If you wish to see a list of every event of a certain type, or within a specific time period, you can filter the events. Click the View menu and select Filter Events. Specify the criterion by which you want to see the events, such as the type of event or the events within a specific amount of time. Exit the Filter mode by clicking the All Events tab within the View menu.

The NT Event Viewer gives you detailed information on what goes on inside your WinNT operating system. You may not be able to find a solution for every problem your computer encounters, but with the WinNT Event Viewer, you can at least locate the problem. ■

by Michelle Nelson

Learn how to use the DOS, Windows 3.1, Windows 95, and Windows 98 operating systems with our easy-to-use tutorials.

Customize Mouse Settings



Along with the keyboard, your mouse may be the tool you reach for the most often to help complete any number of daily tasks. For many users, using a mouse is simply a matter of gliding it across a mousepad and clicking the

left or right buttons when necessary. But if you stop to consider just how often you reach for this small wonder to open and close programs, highlight text, drag and drop items, and navigate through Web pages, the importance of this tiny peripheral begins to take on a whole new meaning. Just try to imagine getting through a day without it.

Because we use a mouse for so many different tasks, it's important to make it as comfortable and efficient as possible. MS-DOS and Windows provide several options for doing this. It's entirely possible that the mouse you are using is merely set to its basic default settings. If this is the case, you're not taking advantage of some of the features that make using your mouse a more productive experience. If your mouse is operating without any problems, customizing it may not seem like such a big deal. But tweaking it to fit your personal tastes will make it a peripheral that's even more preferable to use. In addition, configuring and customizing your mouse is an easy endeavor that takes only a few moments.

MS-DOS 6.22

You are somewhat limited to what you can do with a mouse in MS-DOS 6.22. For instance, you won't be able to use your mouse at the DOS command prompt and in certain older programs. In addition, you are limited as to how much you can configure the mouse settings. Regardless, you'll still find programs that permit mouse input and can benefit from configuration changes that will make your work more efficient and easier.

To alter the default mouse settings in MS-DOS, type `msbackup` at the command prompt and press ENTER on the keyboard. (`Msbackup` was added as a new utility to DOS 6 and includes the Restore, Compare, Backup, and Configure functions.) This command prompts a dialog box

to appear, which gives you five options to choose from. Using the Up and Down arrow keys on the keyboard, highlight Configuration in the dialog box and press ENTER.

The next dialog box that appears on-screen provides an option to configure Video And Mouse. Highlight this option and press ENTER. The Video And Mouse Configuration dialog box has two sections: Screen Options and Mouse Options. Use the arrows to move to Mouse Options and highlight the setting you want to change.

MS-DOS 6.22 has four mouse settings you can configure. The first setting, the double-click option, determines how quickly you need to click the left or right mouse button twice in succession before your system recognizes the action as a double-click. To select this option, highlight it and press ENTER. The double-click speed can be set for Slow, Medium, or Fast. Use the Up and Down arrow keys to move the cursor to your particular preference and press the Spacebar to mark your selection. (A dot will appear next to the setting you choose.) Highlight OK and press ENTER after making your selection.

The sensitivity setting changes the rate of speed at which the cursor moves across your screen as you glide the mouse back and forth. To configure this setting, highlight it and press ENTER. The dialog box that appears gives you the option of setting the sensitivity level to Default, Low, Medium, or High. Move the cursor to your choice and press the Spacebar. Highlight OK and press ENTER to complete the selection.

The acceleration setting changes the rate at which the mouse moves on-screen when you glide it quickly over your mousepad. To change the acceleration rate, highlight the option and press ENTER. Like the sensitivity level, the acceleration rate can be set to Default, Low, Medium, or High.

Finally, configuring the fourth mouse setting to accommodate a left-handed user simply entails moving the cursor to this option and pressing the Spacebar to set it. When this setting is enabled, a check mark appears in the box next to it. Use the same procedure to set the mouse configuration for a right-handed user.

When all of your mouse settings are complete, highlight OK in the Video And Mouse Configuration dialog box and press ENTER. Then highlight Save in the Configure dialog box to enable your changes and press ENTER. When the Backup dialog box displays, highlight Quit, press ENTER, and the DOS command prompt should reappear.

Windows 3.1

Windows 3.1 makes changing your mouse settings a bit easier and more intuitive than MS-DOS by actually letting you test and view the settings you make before enabling them. For the most part, configuring mouse settings in this operating system is merely a matter of clicking a few mouse options.

The various settings you can alter in Win3.1 include the Mouse Tracking Speed, Double-Click Speed, and Swap Left/Right Buttons. Win3.1 also allows you to add Mouse Trails to your mouse movements. This essentially results in a series of mouse pointer shadows that trail any movement made by your mouse. This is a helpful feature for users who have difficulty visually following the mouse across the screen.

To adjust these settings, double-click the Main icon from the Program Manager window. From the Main window, double-click Control Panel, then double-click the Mouse icon. This will open a Mouse window where you can set the Mouse Tracking Speed by either clicking the arrows on either side of the scroll bar to increase or decrease the speed or clicking the scroll tab to drag it to the desired speed location. Use this same method to set the Double-Click Speed option.

To test Double-Click Speed, simply double-click the box labeled TEST. If the double-click action is recognized, the TEST box will change colors. If the double-click action isn't recognized, you'll need to decrease the speed on the scroll bar.

Win3.1 also provides a diagram of a mouse near the top of the window to show how the buttons are currently configured. Depending on the setting, either the left or right button will change colors as you click. To swap the current setting, click the checkbox next to the Swap Left/Right Buttons option. After changing the previous setting, you'll notice that the mouse diagram changes to reflect your new configuration.

The Mouse Trails setting works in the same way. To enable this feature, simply click the checkbox next to the Mouse Trails option. Once you've completed the process of configuring all your mouse settings, click OK.

Windows 95/98

Windows 95/98 (Win9x) provides you with even more options for customizing your mouse settings than its predecessors. In addition to the options provided in Win3.1, Win9x lets you alter how mouse pointers appear on your monitor screen and adjust the length of your mouse trails (that is, if you choose to enable them).

To adjust the mouse settings in Win9x, click the Start button, select Settings, click Control Panel, and double-click the Mouse icon. A Mouse Properties dialog box appears on-screen with tabs labeled as Buttons, Pointers, and Motion. Win95 also includes a General tab, which provides information about what type of mouse you are using. You generally won't need to use this tab to alter mouse settings unless you are installing a new mouse for your system.

The Buttons tab has two sections, one for configuring mouse buttons and one for setting the double-click speed. The Button configuration section contains a mouse diagram (similar to the one provided in Win3.1) that shows the current button setting. This section also provides a brief description about what each button does. To configure the mouse for either a left- or right-handed user, click the circle next to your preferred setting. Once the setting is changed, the diagram will also change. Click OK to set the preference.

Adjusting the double-click speed involves moving a tab to either increase or decrease the speed. Immediately to the right of this area is a jack-in-the-box that you can use to test the double-click speed you've set. To test the setting, double-click the jack-in-the-box. If Windows recognizes your double-click action, the jack-in-the-box will pop up or down. If the double-click isn't recognized, you need to decrease the speed.

Under the Pointers tab, use the pull-down menu provided in the Scheme field to add some variety to the way your pointer appears on-screen. This will show you the various pointer options available to you. Directly below the Scheme field is a display box that details just how the pointers in each scheme will appear on-screen. To customize the pointers in a particular scheme, click the Browse button and select the particular pointers you want to use from the Cursors folder that appears. When your settings are complete, click OK.

Finally, under the Motion tab, you can adjust how fast the pointer moves across the screen. Move the tab to either speed up or slow down your setting and click OK when you're finished. In addition, you can enable mouse trails by clicking the checkbox next to Show Pointer Trails. Next, move the tab to adjust the pointer trail length from short to long.

Using The PRINT SCREEN Key

The PRINT SCREEN key on your keyboard is a versatile tool that you can use to your advantage. Using this feature can help you do everything from enhance documents to brighten your Desktop with a wallpaper theme.



Typically, the PRINT SCREEN key is found among the keys in the top row of the keyboard. When this key is pressed in Windows, the operating system copies the image on your monitor screen and saves it to the Clipboard, which is es-

entially a temporary storage space for copied items.

MS-DOS 6.22

The PRINT SCREEN key has a different function in MS-DOS than in Windows. The biggest difference is that MS-DOS does not have a Clipboard feature where images can be temporarily saved. Instead of copying an image of whatever is on-screen to the Clipboard, MS-DOS sends everything currently on your monitor screen directly to your printer for output.

Windows 3.1

In this operating system, when you press PRINT SCREEN, an image of whatever is on-screen copies to the Clipboard. This process is referred to as taking a screen shot of your monitor screen. If you have more than one window open at a time, you can take a screen shot of only the active window by pressing ALT-PRINT SCREEN.

To view the screen shot you've just taken, use the Paintbrush program. From Program Manager, double-click Accessories, and then double-click the Paintbrush icon. From the Menu bar, select the View menu and click the Zoom Out option. (NOTE: If you fail to click Zoom Out, only a small version of your screen shot will be pasted in the Paintbrush window.)

After you click Zoom Out, a white area appears in the window. Then, click Paste from the Edit menu and a gray, mesh-like image displays. Open the Edit menu a second

time and click Paste once again. The image you copied to the Clipboard now appears in the window underneath the gray shield. Next, open the View menu and click the Zoom In option to return the image to its normal size and make the gray shield disappear.



In Windows 95/98, after taking a screen shot using the PRINT SCREEN key, you can view it in a Paint program window.

You can now edit or enhance the image you've pasted into the Paintbrush window by using the various tools available in the program. When you're done, use the File menu options to make a print or save your screen shot as a file.

Windows 95/98

Win9x also utilizes the Clipboard for image copying. The method of capturing a screen shot using the PRINT SCREEN key and Clipboard is similar to that of Win3.1, but it involves fewer steps.

When the image you want to capture as a screen shot appears on-screen, press the PRINT SCREEN button to copy it to the Clipboard. To view the copied image, select Programs from the Start menu, then click Accessories and Paint. In the Paint program window, click Paste from the Edit menu. Once the screen shot displays in the window, you can use Paint's various tools to edit and enhance the image.

When you are finished altering the image, use the File menu options to print the image or save it as a bitmap (.BMP) file. You might also decide to set the image as wallpaper on your Desktop as either a centered or tiled design.

Add Password Protection

Sometimes it is necessary to increase security measures to keep roaming eyes from peeking into your computer system. Setting up password protection can create a fence that will keep those curious eyes from looking directly into the data on your system. However, the protection available in MS-DOS and Windows probably won't completely shut out those who are curious



enough to dig deeper, it will merely slow them down. Still, the password protection features provided in these operating systems will provide enough of a blanket to shield your system from those looking over your shoulder.

MS-DOS 6.22

To set up password protection in MS-DOS, you need to have DOSHELL installed on your system. DOSHELL is

DOS' version of a graphical user interface (GUI). DOSSHELL gives you a better look at the drives and directories on your system and makes managing your files a little easier.

If you already have DOSSHELL installed, you can assign a password to a Program Group or program item. (A Program Group is a list of programs that only you can open because of the provided password protection that's designed to keep other users from opening and altering the group.) To do this, type dosshell at the DOS command prompt and press ENTER. Once the MS-DOS Shell screen displays, you'll notice that it has four sections. The bottom section, Main, highlights various Program Groups. To assign a password, tab down to the Main section and use the Up and Down arrow keys to highlight a particular Program Group. Press F10 to highlight the menu bar and then select the File menu and press ENTER. Next, use the Up and Down arrow keys to highlight Properties and press ENTER. In the Password line at the bottom of the dialog box, enter your password.

When selecting a password, pick one that you'll remember (but can't be easily guessed by others). Just in case, write the password down and put it in a safe place. Also, remember that DOS requires you to be case-sensitive with passwords. To enter a password, tab over to the Password line and type in your choice. Use the Up or Down arrow key to highlight OK and then press ENTER. Now when you open that particular Program Group in your next work session, you'll be required to enter the password.

Windows 3.1

In Win3.1, you can set your system to require a password each time your screen saver activates. By doing this, users can't dispel the screen saver until they enter the necessary password. You can set up this type of password protection by double-clicking the Main icon from Program Manager, double-clicking Control Panel, and then double-clicking the Desktop icon. Once the window displays, click the Setup button in the Screen Saver section of the window. Next, in the Password Options section of the setup window, click the Password Protected checkbox to enable the feature and click the Set Password button.

If you already have a password but you want to change it to a new one, you'll need to first enter the old password in the provided field. Then, enter the new password on the next line, and retype it in the following field so that Windows can verify it. Click OK to enable the new password. To complete the entire process, click OK in the Desktop window.

You can test the password function by clicking the Test button in the Screen Saver section of the Desktop window. When the screen saver appears, move your mouse to display the password prompt on-screen. Once you enter the new

password, the screen saver should disappear. Although this type of protection is effective for blocking co-workers who are only casually curious, we must warn you that other, more determined users can bypass this password system and eliminate the screen saver by simply rebooting the system.

Windows 95/98

Win9x gives you a few more options than MS-DOS or Win3.1 for putting password protection into place. In addition to assigning a password to your screen saver, you can also designate a password prompt to display when your computer starts. Although this password protection isn't of the strongest variety and can be easily bypassed by clicking Cancel, it still will keep other users from altering your user profiles, which includes such settings as the Desktop layout, background, shortcuts, and other similar configurations.

To designate a password used when your computer starts in Win9x, double-click the Passwords icon in the Control Panel.

To set a password for the screen saver, right-click any blank area on your Desktop. From the pop-up menu, click Properties and then select the Screen Saver tab from the Display Properties window. You can also reach this same destination by clicking the Start button, selecting Settings, then Control Panel, double-clicking Display, and clicking the Screen Saver tab. Under the Screen Saver tab, click the Password Protected checkbox and then click the Change button. A Change Password dialog box will prompt you to enter a new password and confirm it by retyping it. After you've entered the password twice, click OK and then click OK in the Display Properties window.

To designate a password used when your computer starts in Win9x, double-click the Passwords icon in the Control Panel. Under the User Profiles tab, click the circle next to Users Can Customize Their Preferences And Desktop Settings. Next, select the Change Passwords tab and click the Change Windows Password button. At this time, you can also change passwords for other programs, such as your screen saver, so that they are the same as the Windows startup password you assign. When prompted, if you have already established a password, enter it into the Old Password field. Then enter the new password twice and click OK to complete the change. ■

by Blaine Flaming



State Of The PC

The growing problem of information overload is one of the nastier side effects of an increasingly well-connected society. Simply because the mass media and the Internet make it possible, many of us feel compelled to keep up with everything that's happening. This ranges from what's happening at the local school to what's happening in Belgium, which might be one of the key markets for one of the companies that's part of one of your mutual funds.

Trying to keep up with the computer world could be the biggest challenge, as the facts sometimes change between the time shoppers decide on a product and the time they actually get to the store to buy it. PCs for \$500 were an unbelievable deal until companies started giving them away for free. But how well-equipped are these low-cost computers? How can you intelligently shop for hard drives beyond looking at how much storage they offer? If you haven't upgraded your 56 kilobits per second (Kbps) modem for a year, does that put you behind the technology curve?

It's hard to find straight answers to these simple questions—until you read this magazine. The following articles provide at-a-glance summaries of what's happening with every major PC component. This is your chance to come instantly up to speed on the technologies that should (and shouldn't) appear on your buying agenda. It will help you decide whether your PC is current enough or ready for an upgrade. We can't stop the rapid changes in PC technology and pricing, but our product snapshots slow it down long enough for you to make sense of the major trends.

Desktop PCs

New Designs & Connections Join Speedy Processors

State Of The PC

Systems the size of a shoebox, standard DVD-ROM drives, faster processors, and networking and broadband capabilities are just a few of the features that have made their way onto desktop PCs in the past few months. The number of choices that face computer buyers is as daunting as ever, but the increase in options on the low side of the price scale is welcome. With the continuous price decline in desktop systems, you can spend less than \$1,500 and still get a powerful PC loaded with extras such as a DVD-ROM drive and a 17-inch monitor.

Power Goes Up, Price Goes Down

Ever-falling PC prices are a result of increased consumer interest in buying cheap PCs for sending e-mail, subscribing to the Internet, and balancing the budget, as well as hefty competition among PC makers. Some manufacturers are trying to beat the competition by offering desktop systems for free, or at ridiculously low prices of \$199 or less. The fine print in most of these offers is unattractive. In most cases, you'll get stuck signing up with an Internet service provider of the manufacturer's choice for three years, and most of the systems lack a monitor.

There are, however, many legitimately great deals available on PCs that meet a variety of requirements because

as each new technology arrives, the previous generation of high-end PCs becomes today's bargain. If current pricing trends continue, a PC that sells for \$1,500 today with an Intel Pentium III 450 megahertz (MHz) processor and a 17-inch monitor will probably drop below \$1,000 in the next six months. Here's a glance components currently found in desktop systems.

CPU. The current central processing unit (CPU) of choice in high-end systems is Intel's Pentium III chip at clock speeds of 450MHz, 500MHz, 550MHz, and 600MHz. These speeds should rise to 650MHz and 700MHz by the time you read this.

Dominating the \$1,299 and lower price bracket is the Intel Celeron, which is offered at speeds of 333MHz to 500MHz. The Celeron differs from the Pentium III and its Pentium II predecessor because it features 128 kilobytes (KB) of L2 cache on the CPU itself, while the Pentiums sport 512KB of L2 cache. (Cache memory speeds processing by storing frequently used data.)

Speeding the processor race is AMD's K6-2 and Athlon chips. Intel has traditionally dominated the processor market, but AMD now

offers serious competition in nearly every price bracket. AMD's Athlon processor is breaking into the \$1,299 and above price bracket. This processor has delivered higher benchmarks than some Pentium III systems we've seen and comes in speeds of 500MHz to 650MHz. Competing against the Celeron is the AMD K6-2, with speeds of 366MHz to 500MHz and the K6-III, with maximum speeds of 400MHz and 450MHz.

Choosing a brand of chip is a matter of preference. Note that in our benchmark tests, Intel typically outperformed AMD until the Athlon arrived and that AMD chips cost less than Intel chips.

Media. Consumers like the idea of saving data to CDs or watching movies on the PC, which means CD-RW drives and DVD-ROM drives are in high demand. CD-RW drives burn data to CDs and serve as a great storage alternative. DVD-ROM drives are popular because they store more data, produce superior multimedia, and can read both DVDs and CDs. Some manufacturers, such as Sony, are shipping DVD-ROM drives as standard equipment on most models, but you'll pay a little extra for that CD-RW drive. When a DVD-ROM drive

isn't included, 40X CD-ROM drives are the norm on all but low-end systems, which usually include a 24X CD-ROM drive.

Monitors. If you anticipated being stuck with a 15-inch monitor during your next purchase, think again. Many affordable systems include 17-inch monitors, high-end systems often include 19-inch monitors, and 21-inch monitors are the rage for intense graphics environments. Flat-panel monitors are gaining in popularity in the higher price brackets (they can easily add \$1,000 to a system's price) because of their excellent displays and minimal space requirements.

Case Design. This year even more desktop systems have shed the typical



"box" look for attractive contours and ergonomic designs. PCs are becoming more compact, which is fine if you don't work inside the system often and have limited desk space.

So Long, Pentium II

With new technology arriving daily, some components are beginning to disappear. One processor being phased out is Intel's Pentium II, which is no longer needed after the introduction of the Pentium III and the increase in Celeron clock speeds.

You'll also see little of 24X or slower CD-ROM drives. We've also noticed that even systems priced at \$1,000 are shipping with 17-inch monitors, so 15-inch monitors might disappear soon. Large midtower desktop cases are rare unless you purchase a packed multimedia system or request lots of expansion room for adding components.

Around The Corner

In the next few months, 650MHz and 700MHz Intel Pentium III processors will be available and Intel will release its "Coppermine" processor, an enhanced version of the Pentium III. Another breaking technology from Intel is the upcoming 820 chipset. This new chipset supports the Rambus memory technology, which is expected to take the place of synchronous dynamic random-access memory (SDRAM). Rambus will increase PC performance in memory-intensive tasks such as three-dimensional applications, video editing, and desktop publishing.

Other emerging technologies are DVD-RAM drives for rewriting DVDs and broadband technology. Most systems still include a standard 56 kilobits per second (Kbps) V.90-compatible

modem, but home networking is growing in popularity, along with high-speed cable modem and digital subscriber line (DSL) Internet connections. Look for more desktop PCs to include connections for Ethernet networks and high-speed Internet access.

The popular all-in-one PCs usually consist of a flat-panel monitor and system components installed in the rear and base of the display, as with the Gateway Profile pictured on the previous page. Most all-in-one PCs can't be upgraded on the inside, but they offer Universal Serial Bus (USB) ports and usually two PC Card ports for adding peripherals. With all-in-one PCs, order what components you need up front to avoid a hassle later.

The Budget Shopper

To assist your shopping, here are the components you can expect to find in the \$500 and under, \$500 to \$1,299, \$1,300 to \$2,000, and \$2,500 and higher price ranges.

\$500 and under. These cheap PCs serve as great second computers, systems for the kids, or machines for an entire office. Don't plan on finding a huge hard drive or much memory in these systems, but when it comes to surfing the Internet or running word processing and financial programs, most systems in this category will handle the load. Expect to find an Intel Celeron or AMD K6-2 processor at speeds of 366MHz or 400MHz and a hard drive between four gigabytes (GB) and 6GB. Most of these systems feature a 32X or even 40X CD-ROM drive, a 56Kbps V.90-compatible modem, 32MB of RAM, and a video card with 4MB of memory. For \$500, the system usually doesn't include a monitor, so plan on spending at least another \$200.

\$500 to \$1,299. For processors, you'll have a choice of a 466MHz Intel Celeron or an AMD K6-2 475MHz or 500MHz, and a few Pentium III 450MHz processors are available. Hard drives will range from 6GB to 8GB; higher-priced PCs may have 13GB. There should be at least 64MB of RAM and 8MB of video memory for handling graphics applications. Although a 40X CD-ROM is usually standard in these configurations, some might include a 6X DVD-ROM drive. You'll also find either a 15- or 17-inch monitor standard in this price range.

\$1,300 to \$2,500. For this price, you can start loading on the extras. Start by choosing nearly any Intel Pentium III processor up to 600MHz or the AMD Athlon up to 650MHz. All of these PCs should have a minimum of 128MB of RAM, 16MB to 32MB of video memory, and a 13GB to 20GB hard drive. A DVD-ROM drive is usually standard on these systems, and you might find an integrated 150MB or 250MB Zip drive and a CD-RW drive. Most of these systems have a 17-inch monitor available. PCs at this price range from small-business machines to consumer systems built for intense graphic environments such as video editing or desktop publishing.

\$2,500 and higher. Besides a fast 600MHz Pentium III or Pentium III Xeon processor, the hard drive is where it's at in these systems. You might find a few 20GB hard drives, but most systems offer a 27GB to 37GB hard drive and 128MB to 384MB of RAM. Expect to find 32MB of video memory, DVD-ROM and CD-RW drives, a high-end video card, and a 19-inch monitor as standard equipment. ■

by Buffy Cranford-Petelle

What's OUT

- Pentium II processors
- Midtower cases

What's IN

- 17-inch or larger monitors
- DVD drives
- AMD's Athlon processor

What's UPCOMING

- All-in-one case designs
- Rambus technology
- Broadband capabilities

Notebook PCs

What To Expect At Today's Key Price Points



Thanks to a steady stream of faster mobile processors from Intel and AMD, notebook manufacturers update their product lines several times a year, which is a mixed blessing. On one hand, you don't wait long to buy the latest and greatest, and bargain hunters find that each processor upgrade makes yesterday's models more affordable. On the other hand, if you feel the need to always have the best PC on the block, you must upgrade often at a high cost.

Whatever your situation, temper your expectations with your budget. We break today's notebook market into three main categories of notebooks, each of which has certain feature and performance thresholds.

The Utilitarian: \$1,500 & Less

If you're squeezing the most out of each dollar spent on a notebook PC, you'll be happy with many of the PC

models selling for around \$1,500. Units at this level lack the jaw-dropping multimedia capabilities of higher-priced units, but they prove very adept at handling basic computing needs.

Current \$1,500 notebooks usually feature 300-333 megahertz (MHz) Pentium II processors, 333-366MHz Celeron chips, or 350-400MHz AMD K6-2 processors. Units with 32 megabytes (MB) of RAM are common, although 64MB (or in rare cases 128MB) isn't out of the question. Expect to see hard drives ranging from 3 to 4.3 gigabytes (GB) in size, though you'll find the odd 6 or 6.4GB drive. 20X and 24X CD-ROM drives are a staple at this price range (few come with DVD), 56 kilobits per second (Kbps) modems are standard, and displays should be between 12 and 13.3 inches in size (measured diagonally). Most of these will be higher-quality active-matrix displays rather than older passive-matrix LCDs, thanks to new technology and manufacturing techniques.

The Bourgeois: \$1,500-2,500

Although middle-class notebooks don't come with all the latest bells and whistles, they offer respectable multimedia capabilities and solid performance in a variety of applications.

Look for 333-400MHz Pentium II processors and Celerons up to about 433MHz. A few companies offer AMD chips in this price range, although they are a bit less common than in value-priced lines. You should get at least

64MB of RAM with units at these prices, and some will pack in 128MB. Hard drives 6 and 6.4GB in size are the standard in this category lately, but 10GB drives are becoming more common. Some \$2,500 notebooks still feature CD-ROM drives, but DVD drives have become more common lately. 56Kbps modems are fairly standard, some units will come with built-in network connectivity, and display sizes generally range from 13.3 to 14.1.

The Jones': \$2,500 & Up

Top-end notebooks, such as the Compaq Armada 7800 pictured on this page, can make you forget about your desktop PC. Most come with DVD-ROM drives, they all include nice displays and speakers, and they have plentiful RAM and hard drive space. New lithium-ion battery technology combined with better power-saving features in today's mobile processors now makes batteries last considerably longer than they did several months ago. Many run without AC power up to and beyond three and four hours.

If you shell out \$2,500 and up, expect a 366-400MHz mobile Pentium II processor, although some notebooks will ship with 433-466MHz Celerons. By the time you read this you may even be able to get a notebook with a mobile Pentium III. These notebooks feature lots of RAM (a few still come with 64MB, but many pack 96MB, 128MB, or more). Hard drives in this price range should all be 6GB and larger, and most will be in the 10-14GB range. As in lower price points, 56Kbps modems are generally standard, and Ethernet network connection ports are fairly common. ■

by Chris Trumble

What's OUT

- Small, passive-matrix displays
- Batteries that last two hours or less

What's IN

- Large, active-matrix displays
- Pointing sticks, faster processors

What's UPCOMING

- Mobile Pentium III processors
- More RAM
- Bigger hard drives

PDA's

Visor & Wireless Access Fuel A Hot Category

State Of The PC

Personal digital assistants (PDAs) help organize your life by keeping track of appointments, contacts, and tasks, but they're much more than just electronic organizers. The latest PDAs offer features that provide access to a broad range of information, whether it's your personal information, reference data, or Web documents. An increasing number of units even let users view data in color, with no cords attached.

CE In Living Color

All of the newest handheld computers (PDAs with a keyboard but no hard drive) include color displays. Windows CE, the prevailing operating system on non-Palm devices, has supported color displays since version 2.0. Psion, one of the few handheld manufacturers not using Windows CE, relies on EPOC32 as its operating system of choice. Until recently, EPOC32 supported only grayscale displays, but Psion's new Series 7, recently released in Europe, includes a color display.

Along with offering color, displays on the handheld platform are providing improved quality. New units such as the NEC MobilePro 800 are achieving SVGA resolutions of 800 x 600 pixels. Higher resolutions mean sharper images and the ability to see more information on the screen at once.

While color is widely available on the handheld platform, we can't say the same about the palm-sized

platform (devices that lack a keyboard and use handwriting recognition for data entry). The Palm OS dominates in this market, but unlike Windows CE, it supports only grayscale displays. With Palm's commanding market share, grayscale displays are going nowhere until Palm finally supports color displays.

One area Palm has consistently mastered is size. No one better understands that thin has always been in than 3Com and its Palm Division. Palm introduced the smallest fully functionally PDA on the market when it released the extremely popular Palm V this year. At a weight of just 4 ounces, the Palm V is 1/3 lighter than the Palm III.

Going Wireless

In the next year, PDAs' access to information will improve with wireless technologies that let users pull information from the Internet and access e-mail directly through a PDA, without connecting to a phone line.

A few wireless devices, including the Palm VII (pictured above), already offer such access. New companies such as OpenSky are providing wireless data access through add-on cards for the Palm OS, and eventually for Windows CE palm-sized units. Sierra Wireless has rolled out a PC Card

providing wireless functionality for Windows CE units.

Bluetooth-equipped devices may also burst on to the scene next year. This wireless technology provides short-range (30 feet) communications among a wide variety of devices, such as desktop PCs, PDAs, and cell phones.

Speaking of cell phones, smart phones may finally strike it big this year. Qualcomm's recently released PDQ Smartphone uses the Palm OS and combines PDA functions with a cell phone. If users don't mind giving up access to their information while on the phone, smart phones will be big this year.

In the past, Windows CE devices offered more features than Palm OS devices. Handspring plans to change that. Handspring, established by Palm founders Jeff Hawkins and Donna Dubinsky, just released a palm-sized, Palm OS device that promises all the functionality of a Windows CE device. The Visor is the size of the Palm III and contains an external expansion slot known as a Springboard Slot. Developers will manufacture Spring-board modules that will snap into the expansion port to add features such as wireless connectivity, MP3 (music) playback, paging, and modem connectivity.

Visor's unique features come with the bonus of having the lowest price on the market. The Visor Solo model ships with two megabytes of RAM for \$149; \$30 more buys a Hot Sync cradle.

The PDA market promises to deliver an exciting year, even if Palm doesn't release a color display. Advances in wireless and smaller sizes will give users faster, easier access to information than ever before. ■

by Chad Denton



What's OUT

- Grayscale displays
- Low resolutions

What's IN

- Palm OS in PDAs
- Windows CE in handhelds
- Color displays

What's UPCOMING

- New expansion capabilities
- Wireless access
- Handspring Visor

Operating Systems

Windows Holds Steady As Win2K Approaches

State Of The PC

Everybody who uses a computer uses an operating system (OS), so it's a pretty important topic. But despite computers' seemingly daily changes, the OS development curve remains fairly flat. The most commonly used consumer OS, Windows 95, has been around for more than four years now, and its heir apparent, Windows 98, is a veritable old-timer at more than a year old. But is that really a bad thing?

The answer to that question, like many others, depends on whom you ask. Your OS is what connects you to your PC; it acts as an interpreter or a tour guide. Drastic changes in a tool this important can be disruptive and counterproductive. To this day some users won't give up Windows 3.1 because they are uncomfortable with the new interface and don't want to learn how to use their PCs all over again. On the other hand, Windows detractors and technophiles might enjoy a change of pace and would even welcome the challenge of learning new skills.

Whether you're looking for something new or are happy to stick with Win95 and Win98's familiar Desktop, your needs are well served within the framework of today's OS market.

The Status Quo

Win98 is still Microsoft's latest consumer OS, and it hasn't changed much, aside from a bit of an upgrade in the form of Win98 Second Edition.

Win98 SE is basically the original package with some new features, such as the addition of the Internet Explorer 5.0 Web browser (Win98 originally shipped with version 4.0), a more comprehensive database of driver software for new peripherals, enhanced networking features that facilitate easier sharing of Internet connections and printers, improved support for Universal Serial Bus (USB) devices, and DirectX 6.1 application program interfaces (APIs, sub-programs that help Windows communicate with programs), that enhance Win98's multimedia capabilities.

The good news for those that don't want to leave their OS comfort zones is that Win98 SE shares a user interface with Win98, which looks much like Win95. The continuity provided by Microsoft's philosophy of "Evolution, not revolution," makes for a nearly flat learning curve and smooth transitions from Win95 to Win98 and even to Windows NT 4.0, which also uses a Win95-style interface. WinNT is a primarily business-oriented OS designed with the stability and security to serve companies with computer networks.

The Changing Of The Guard

Microsoft's next consumer OS will be Millennium, due out some time next year. More immediately, WinNT 4.0



will be replaced by Microsoft's latest business OS, Windows 2000. With Win2K, Microsoft hopes to combine some of Win98's strengths (such as Plug-and-Play hardware support, USB support, and increased browser integration) with WinNT's networking capabilities and traditional strengths.

Those who want to leave Windows altogether can choose from a couple of strong candidates. The popular Linux, a derivative of the network OS UNIX, attracts some because it is free and because programmers can configure it to meet their needs. Others use Linux because they find it more stable than Microsoft's products, or simply because they don't like Microsoft. While the original text-based Linux interface appears sharply different from OSes such as Windows and MacOS, point-and-click user interfaces for the OS are available for free download. BeOS is another Windows competitor, and while it may have a fairly small user base, it, too, offers a user interface that Windows users will find familiar. ■

by Chris Trumble

What's OUT

- Text-based user interfaces
- Manual hardware configuration

What's IN

- Plug-and-Play compatibility
- Browser integration
- Networking features
- Linux

What's UPCOMING

- Windows 2000
- Microsoft Millennium

Software

The Internet's Takeover Continues

State Of The PC

As hardware prices keep falling, software is becoming one of the most expensive components of computing. Adding even the low-end version of Microsoft Office 2000 can cost well over \$400, which is close to the price of some new PCs.

Software prices may soon follow hardware's downward trend, thanks to the Internet. Many companies are beginning to offer Web-based services to replace costly software solutions. As a result, it might be time to reconsider what you deem essential software.

The Web Goes To Work

Web-based applications are already beginning to replace traditional software tools. Free Web-based mapping services, such as MapQuest (<http://www.mapquest.com>), for example, provide features similar to those in CD-ROM-based mapping applications.

Web-based calendars may be an even more powerful service. Yahoo! (<http://www.yahoo.com>, pictured above) and Excite (<http://www.excite.com>) offer online planners that let you schedule appointments, maintain contact information, and track those nagging tasks. These services can synchronize with software such as Microsoft Outlook or a personal digital assistant (PDA), such as a Palm computing device.

Web browsers are even beginning to replace other Internet software. Web-based e-mail services have been popular for some time, thanks to service

from major players such as Yahoo!, Excite, and Microsoft's Hotmail (<http://www.hotmail.com>). That reduces the importance of a standalone e-mail program (or client).

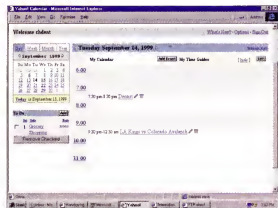
Of course, privacy and security issues arise any time you use a Web-based service. Hotmail has been the victim of a couple of recent security scandals that should remind users of the greater potential for security breaches online.

Traditional software is still the backbone of PC work, but its pricing structure is in flux. Every small-business user needs some sort of office software for the foreseeable future. One software suite receiving a lot of recent attention is Star Office, recently acquired by Sun Microsystems. This package, which is compatible with Microsoft Office file formats, is free for individual users and costs only about \$40 for commercial users.

Applications that take advantage of the Internet are becoming more popular. Editing packages that let beginners design Web pages are must-haves for consumers and businesses looking to establish a Web presence. Office 2000, Windows 98, and other products integrate Internet features throughout their applications.

Software For Rent

The Web has enormous potential as a delivery tool for programs that go well beyond simple mapping and



scheduling functions. A July report by International Data Corp. (IDC) cited large growth potential in the emerging Application Service Provider (ASP) market.

ASPs essentially rent applications to businesses. These applications are usually expensive, complex products that are often used only by very large companies. Businesses renting software have less control over issues such as deciding hardware platforms, but they also have fewer worries. ASPs may eliminate the need for small and mid-sized businesses to hire an information technology staff and let companies use software they may otherwise be unable to afford. The IDC report lists e-commerce, supply chain, payroll, and collaboration applications as the most likely programs to be provided by ASPs.

Powerful applications delivered over the Internet may be free if Sun Microsystems' plans work out. Star-Portal will provide users Star Office-based applications over the Internet at no charge. While the idea of Web-based office applications is appealing, Sun has had little success with similar past efforts. But perhaps it's finally time for Sun's concept to shine. ■

by Chad Denton

What's OUT

- Software with no Internet features
- Shrink-wrapped software that duplicates features found free online

What's IN

- Online applications
- Internet-oriented software
- ASPs

What's UPCOMING

- Software rental
- More Web-based applications and services

SHOP FOR HARDWARE

AND SOFTWARE IN YOUR UNDERWEAR

You're ready to shop for a new computer? But you're too busy to leave your computer?
Shop for hardware, software, you know where: on-line. You'll find all the computer stuff you need.

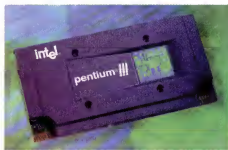
It's fast. It's safe. It's a lot easier to browse the web.



Worldwide. Webwide. Visa® It's everywhere you want to be.®

Processors

Intel & AMD Wage War In Fields Of Silicon



STATE OF
THE PC

Today, the PC industry is releasing new desktops and notebooks at a more frenzied pace than ever before. Many consumers are hesitant to buy, fearing instant obsolescence, and the most likely cause of this fear is the seemingly constant release of newer and faster processors.

A Tale Of Two Companies

The PC microprocessor market was a three-pronged race between Intel, Advanced Micro Devices (AMD), and Cyrix less than two years ago. Intel was setting the standard with its Pentium chips; the two smaller companies were scrabbling for scraps of market share.

As competition increased, the success of each processor generation became more important. When Cyrix missed a few steps, it quickly fell behind. The parent company of Cyrix, National Semiconductor, saw the problems it was having and put it on the market, hoping to get out of the PC business.

Intel continued to push ahead, and AMD began to gain ground in the bargain-PC market, thanks to its pricing

and partnerships with PC manufacturers. Today, AMD presents a challenge to Intel, especially in lower-priced PCs. Intel is still the leader, however, due to brisk sales of its Celeron and Pentium III lines, which dominate the mid- to upper-priced PC markets.

Current Offerings

The main areas of competition in processor development are:

- clock speeds (processor speeds measured in megahertz [MHz] or millions of clock cycles per second)
- the number of transistors (more transistors mean the ability to do more work each clock cycle, which means higher performance)
- the width of the wires that make up processor circuitry (the smaller the circuitry, the faster data moves)
- the amount of cache memory, which is high-speed memory for frequently accessed data that is faster than RAM, included with the chips.

Intel has historically been ahead of AMD in several of these areas. The Pentium III still has more cache, including 32 kilobytes (KB) of on-die, Level 1 (L1) cache (memory that's part of the processor's main circuitry), and 512KB of L2, or secondary cache, stored in its single edge connect cartridge.

AMD's Athlon processor comes with 128KB of L1 cache, but, even though it supports L2 cache stored on a PC's motherboard, the processor does not include secondary cache. The newest

Athlon processors, however, boast higher clock speeds (up to 650MHz) than the fastest Pentium III (600MHz). They also have more transistors (22 million) than the PIII (9.5 million.)

Intel and AMD presently offer processors with circuitry pathways that are .25 microns (or about 1/100,000ths of an inch) wide, and both companies will probably move to .18-micron pathways.

Both Intel and AMD also offer wide selections of processors aside from the Pentium III and Athlon processors (which are only for desktop PCs as of this writing). Intel's popular Celeron line offers solid performance and affordability. Celerons come in speeds of up to 500MHz for desktops and up to 466MHz for notebooks. Intel's Pentium II processors are still used in both categories, as well. They are available with clock speeds of up to 450MHz in desktops and 400MHz in notebooks.

AMD's K6-III and K6-2 chips are also being used in both desktop and mobile configurations; the K6-2 chips offer speeds of up to 500MHz and 475MHz, respectively. The company's K6-III line comes in speeds of 450MHz for desktops and notebooks.

The Future

According to Moore's Law, processors will double in speed and capacity about every 18 months. In two years, we've seen processor clock speeds more than double. Sources at Intel indicate this trend will continue and that chips will reach the one gigahertz (GHz) clock speed within the next 12 months. The bottom line is those who wait until the fastest processors are available to buy a PC will be waiting a long time. ■

by Chris Trumble

What's OUT

- Cyrix microprocessors in PCs
- Any processor slower than 300 megahertz

What's IN

- Lots of cache memory
- Quarter-micron circuitry

What's UPCOMING

- Processors .018- and .013-micron copper circuitry
- One gigahertz (GHz) clock speeds

Displays

CRTs Hang On Despite LCDs' Advantages

State Of
The PC

Waiting for the next revolution in desktop PC displays sometimes feels like waiting for Haley's Comet to make its once-every-76-years appearance. We've heard for a long time that liquid-crystal displays (LCDs), such as the SGI 1600SW shown on this page, will soon replace bulkier cathode-ray tube monitors. We've also been waiting a long time for that to happen. Thanks to the stubbornly high price tags of LCDs, the cheaper CRT monitors remain a staple of mainstream desktop computing.



or not. The more pixels the screen has, the longer it takes the electron gun to cover the screen. Therefore, the higher the CRT's resolution, or number of pixels on the screen, the slower the refresh rate, or rate at which new images appear. The lower the refresh rate, the more the screen flickers. All this adds up to a technology that's ripe for replacement.

The Present Competition

Liquid-crystal displays (LCDs) provide the solution. They take up minimal desk space, and you even can mount many of them on the wall. Instead of the CRT's shadow mask, LCDs use a grid of polarizing filters to display images on a flat screen. Because LCDs use liquid crystal to light up the display instead of electrons, low refresh rates cause little flickering. Also, LCDs use digital signals from the graphics card, making input variations highly unlikely. Finally, without a cathode ray tube inside, LCDs stay much cooler than CRTs. LCDs are already prevalent in space- and heat-sensitive environments such as stock trading floors, restaurants, and hospitals.

LCDs with sharper images use active-matrix technology, in which each pixel is controlled by its own transistor.

The number of pixels on large screens requires more transistors than the PC's graphics card can efficiently control. For now, this keeps manufacturers from building LCDs with high resolutions larger than about 18 inches.

Thus, users who demand high graphics output still opt for 21-inch CRTs over LCDs. While these displays suffer the typical CRT problems, they offer a bigger screen than almost any other display on the market. A high-end 21-inch display contains an aperture grille instead of a shadow mask, meaning the pixel phosphors align themselves on a grid of fine wires so the screen can be pancake-flat, eliminating the distortion of a shadow mask display.

For most computer users, the affordably priced 15-, 17-, and 19-inch CRTs are the monitors to consider. A growing number of the smaller CRTs use aperture grille technology, providing an almost flat screen with less distortion. Some developers provide a vertically flat screen that minimizes glare from overhead lights. A few manufacturers have experimented with digital display signals such as EIZO's Digital Signal Processor, which digitally optimizes analog signals for the CRT monitor.

As the price of LCDs begins to decline, the popularity of CRTs will, too. For now, an LCD with a viewing area of 18 inches costs approximately \$3,000, while a CRT of the same screen size costs about \$500. Manufacturers are researching ways to integrate the drive electronics with the active-matrix LCD electronics so they can build larger LCDs with higher resolutions and sell them cheaper. As soon as that happens, the 21-inch CRT will probably be out of a job. ■

by Michelle Nelson



What's OUT

- Smaller CRTs
- Shadow mask technology in CRTs



What's IN

- High-resolution LCDs
- Large CRTs
- Aperture grille technology in CRTs



What's UPCOMING

- LCDs larger than 18 inches
- Competitive LCD pricing

Removable Storage

Portable Media Now Offering Gigabytes Of Space



Skate On!
The PC

The removable storage market's volatility this year is due to larger-capacity media, faster devices, and many more options for connecting the devices to your personal computer. We took a look at cartridge-based, rewritable optical, and tape cartridge storage systems.

Cartridge-Based Storage

Reviewers have been praising Castlewood's remarkable ORB drive (pictured; \$199, <http://www.castlewood.com>). The ORB uses lowpriced 2.2GB cartridges (\$29.95) to achieve storage speeds that rival low-end hard drives (6.8-12.2 megabytes per second [MB/sec.] sustained data transfer rate). If the ORB lives up to Castlewood's promises and goes unchallenged by rival companies Iomega and Imation, it could well become the leading cartridge-based storage device.

By the time you read this, Castlewood probably will have released ORB drives with more connection options, such as a 40MB/sec. Ultra Wide SCSI version that can also connect to a

Universal Serial Bus (USB) port by using an included "smart" cable (\$249). In addition, you may see an ORB that uses the new 50MB/sec. FireWire (IEEE-1394) interface.

Imation just revamped its line of SuperDisk drives, which can use common 1.44MB diskettes, as well as 120MB SuperDisks (10 for \$99) and Encrypted SuperDisks (three for \$64.95). Newer SuperDisk drives are faster (up to 27 times faster than a 1.44MB diskette) and have more connection options such as USB, parallel, Integrated Device Electronics (IDE), PC Card, and Small Computer System Interface (SCSI) models.

Iomega recently released its Zip 250MB drive (\$129.95 after \$40 rebate) in a USB version (\$179.95), with an optional PC Card-USB adapter for \$39.95. Alan Dunton, a spokesperson for Iomega, hints a future adapter may let Iomega's popular 40MB Click! drive connect to desktop PCs, but there is no word on which interface it might use.

Optical Storage

It took a few years, but it appears CD-rewritable (CD-RW) has become the dominant rewritable compact disc format. The advantage of this format is that each 650MB disc (\$6) can be rewritten thousands of times. Look for internal models from Iomega (ZipCD, \$179.95 after \$30 rebate) and Creative Labs (Blaster CD-RW 4224, \$179).

The CD-recordable (CD-R) format, which you can write to once but never again, would be a sound choice for

archiving records and business data if its drives were cheaper. Prices for CD-Rs have fallen to about \$2, but CD-R drive prices are still \$300-\$500.

If you're looking for rewritable storage in a digital versatile disc (DVD) drive, your options are less confusing than they were a year ago. The DVD-RAM standard appears to have taken the lead in the market with its 2.6GB per side rewritable discs selling for \$32 (\$51 for a 5.2GB double-sided disc). Creative Labs, Sony, and Toshiba sell DVD-RAM drives for about \$145-\$205.

It may pay to wait for the new DVD-RW drives, which may be out by the time you read this. Sony, Philips, Hewlett-Packard, and others are developing this new 3GB per side, 100,000-times rewritable format, but no prices are available as of this writing.

Tape Storage

Tape cartridge drives are slower than other removable storage devices, but they are getting faster. They also retain the advantage of being able to back up most hard drives on one tape. HP offers 20GB (compressed capacity; 10GB uncompressed) Travan drives for \$259 and \$45 per tape. Its internal IDE drive can transfer up to 110MB of compressed data per minute.

Diskettes

Don't forget about diskette drives just yet. They may be slow and have a limited capacity, but they're also cheap, near-universal, and still adequate for many non-networked file transfers. ■

by Marty Sems

What's OUT

- Slow parallel port connections
- CD-R, but not 1.44MB diskettes just yet

What's IN

- USB
- ORB Ultra Wide SCSI/USB Drive
- Hard drive-like performance; CD-RW
- Encrypted SuperDisks

What's UPCOMING

- DVD-RW
- FireWire ORB

Hard Drives

100GB Capacities May Be Just A Year Away



State Of
The PC

Hard drives that were considered monstrously huge in the past are too small and slow for today's computers, but tomorrow's drives will blow them all away. New drives with 27, 37, and even 50 gigabyte (GB) capacities (like the 50.1GB Seagate Barracuda seen above) hold more and are much faster than the 1-8GB models of just a few years ago.

How Much & How Fast

Hard drives are doubling their capacities every 12 months due to advances in the areal density (gigabits of data per square inch [Gb/sq. in.]) of hard disk platters. For example, Toshiba's 2.5-inch MK6414MAP has 11.6Gb/sq.in., and IBM has achieved 20Gb/sq.in. under laboratory conditions. You probably won't find areal density figures advertised with a hard drive, so check the vendor's Web site for information.

Hard drives are also running at faster spindle speeds, which describes how fast the platters spin during use. Desktop drives with spindle speeds of 5,400 revolutions per minute (rpm) are

common, but 7,200 and 10,000rpm drives are also available. On the high end, Hitachi's 2.5-inch DK3E1T-91 is a 12,030rpm screamer found mostly in mainframe computers.

Higher areal densities and spindle speeds mean faster performance. A denser drive will read more data on each revolution of the platters. Likewise, a faster spindle speed means more revolutions per second and less waiting for a certain piece of information to "spin around" to be read (called **latency**, measured in milliseconds [ms]).

A drive's access time tells how long it takes to find the right track (concentric ring of data on the platter) and the information the drive is looking for. A faster access time (14ms or less) will help randomly accessing programs, such as business applications, to run faster. (NOTE: Don't confuse access time with seek time, which simply states how quickly the drive can locate the right track. Add latency to seek time for access time.)

The main benefit of a dense, fast hard drive is a high media-to-host (platter to computer) data transfer rate. This is the number of megabytes per second (MB/sec.) the hard drive can read from the platters, send to its cache buffer (temporary memory), and then to the computer. Look for average read data transfer rates of 22MB/sec. or higher and write rates of 20MB/sec. or more.

You can ignore the burst data transfer rate (buffer-to-host) because you'll rarely notice it. In fact, if you compare drives of a similar capacity, spindle speed, and interface, you may

never notice any difference in their performance. Price and warranty are more important for normal desktop use. Access times and data transfer rates only become critical in servers that see heavy use or workstations that deal with huge files such as video.

A large cache buffer in your drive could mean fewer jumps and pauses during video clips and games. Look for a buffer of at least 512KB; 2MB is better.

Your drive's interface, or connection to your computer, may be either Integrated Device Electronics (IDE) or Small Computer System Interface (SCSI). Today's IDE interfaces run as fast as 66MB/sec. The Ultra2 SCSI interface is capable of 80MB/sec. in low-voltage differential (LVD) systems. (Newer SCSI systems use LVD's weaker electrical pulses to send information much faster.) Servers may benefit from the new 160MB/sec. SCSI or 200MB/sec. Fibre Channel (FC) interfaces.

Modern read heads, which skim the platters and magnetically sense data, are the magnetoresistive (MR) type. A more sensitive alternative in new drives is giant magnetoresistive (GMR) heads. Forget drives that use the older inductive read heads.

Other Applications

You'll probably see IBM's 1-inch 340MB Microdrive in digital cameras and handheld PCs. You'll find Quantum drives in digital video recorders, and Magellan Driver Information Systems chose Fujitsu drives for its 750NAVTM car navigation system. As prices continue to drop and performance and capacity continue to rise, you'll notice hard drives in more and more consumer devices. ■

by Marty Sems

What's OUT

- 16.7MB/sec. IDE
- 20MB/sec. SCSI
- Sub-8.4GB drives
- 128KB cache buffers

What's IN

- 37-50GB drives; 7200-10,000rpm
- Data transfer rates of 66MB/sec. for IDE
- 80 MB/sec. for LVD Ultra2 SCSI

What's UPCOMING

- 100GB drives
- 20Gb/sq.in. areal density
- Handheld PCs and digital cameras with Microdrives

Modems

Cable & DSL Are The Latest Online Craze



State Of The PC

In the past few years, modems have changed in obvious and subtle ways. On the subtle side, the introduction of Universal Serial Bus (USB) modems is one improvement we can chalk up for 1999, but it involves little more than replacing a modem's serial port with a USB port. The element of speed, however, is a focal point of many significant changes. Modem speed has dramatically improved from the 33,600bps (33.6 kilobits per second [Kbps]) models of 1995 to the 56Kbps modems introduced in 1997. Then, in 1998, the widespread implementation of the V.90 standard replaced the two competing and incompatible standards for 56Kbps modems: x2 and K56flex. Before V.90, modems from all manufacturers couldn't communicate with each other, at least not at top speed.

Today, although the V.90 standard has united 56Kbps modems so that they are theoretically capable of reaching a speed of 56,000bps, there is still something else holding them back. The Federal Communications Commission (FCC) has specific restrictions on phone line voltage that limit 56Kbps modems to a top speed of 53,000bps. So, what improvements are left now

that regular modems are already as fast as they can get? Can consumers really expect to blaze online at the speed of light someday? Well, that day hasn't arrived yet, but new technologies are currently available that promise to break the 56Kbps barrier.

The Need For Speed

The two main contenders are cable modems and Digital Subscriber Line (DSL) routers (often referred to as modems). Both offer huge improvements in speed and boast several added conveniences. With regular modems, if you're online, you're also using the phone line and blocking phone calls. Cable and DSL let users go online without tying up their phone lines.

These two Internet access options, as well as the Integrated Services Digital Network (ISDN) method, are known as broadband services. Broadband transmission is advantageous because it lets several data streams transmit simultaneously over communications lines due to bandwidth capabilities. By accessing the Internet in this manner, broadband services offer incredible speed and other advantages over analog modems.

A few years ago, ISDN was touted as the consumer answer to speedy Internet access. That's not true anymore. Cable modems and DSL currently dominate the broadband market due to better speed, added conveniences, and giving consumers more for each dollar spent.

A cable modem lets data flow between your PC and the Internet by using something found in most homes:

cable television. Some of the cable line bandwidth is digitized and used for data rather than television signals, so in theory, its transmissions can pass from the Internet to your computer at speeds of up to 27 megabits per second (Mbps), but given the limitations of most computer systems, that number is more likely to be between 1Mbps and 3Mbps, which is on par with DSL. In the other direction, speeds tend to be between 500Kbps to 2.5Mbps, making cable somewhat faster than DSL.

DSL uses a router to transmit data through the standard telephone wires found in most homes. But DSL routers aren't actually modems; they're entirely digital so there's no analog-to-digital conversion. There are various versions of DSL, and the speed rate depends upon the type of DSL you have. Asymmetric DSL (ADSL) sends data from the 'Net to your PC at speeds ranging from 1.5Mbps to 9Mbps; but data sent in the other direction ranges from 256Kbps to 640Kbps. Symmetric DSL (SDSL) has speeds up to 3Mbps in both directions.

Another distinction between cable and DSL is that DSL users each have their own phone line setup. Cable users share a cable network, so each time a PC joins the network, resources are further split. For that reason, it's still unknown how cable networks will handle traffic for millions of users. The major disadvantage of cable and DSL services is that they aren't accessible nationwide. Because of complications involving old or faulty communications lines or providers that require users to be within a certain number of feet of a central office, some U.S. residents will have to live without broadband services for now. The good news for many residents is that the wait shouldn't be long. ■

by John Lalande

What's Out

- Modems slower than 56Kbps
- Old x2 and K56flex standards
- ISDN connection methods

What's In

- 56Kbps modems, V.90 standard
- USB connection for external modems
- Regional DSL and cable access

What's UPCOMING

- Nationwide access to DSL and cable modems
- Upgraded DSL and cable network systems

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Input Devices

Teaching Old Mice New Tricks



Every computer sold in the last decade has come with both a keyboard and a mouse, so many users may never need to buy an input device separately. And since few drastic changes have been made to mice since 1968 when Doug Engelbart introduced the first mouse at a San Francisco conference, it's easy to overlook such items when discussing upcoming technological advances. But input devices do play an important role in modern computing, and there are a few changes taking place in the input device industry today that you should be aware of.

The biggest wave of change in the past few years has revolved around ergonomics, which involves scientifically designing devices to blend with the human form for comfort and ease of use. A good example is Microsoft's Natural Keyboard. Its keys are separated in the middle of the keyboard and angled slightly outward so that the right and left hands can be held closer to their natural positions while typing. This design prevents strain on muscles and tendons in the hands and wrists of regular users.

In addition, many input devices have begun to embrace universal serial bus (USB) connectivity. USB devices are easier to install than serial (or even PS/2) devices because they usually don't require users to turn off their computers prior to installation or reboot them afterwards to finalize the process. The majority of input devices available today, however, are still designed for use with computers' PS/2 ports, and many come with adapters that allow users to plug them into serial ports. But more USB devices are on the way, and an increasing number of PS/2 devices have begun to ship with USB adapters rather than their serial counterparts.

The use of touchpads and pointing sticks is also on the rise. For years, touchpads have been common on notebooks, where space is at a premium. Touchpads are just now making their way into the desktop computer market as well, either within keyboards that have included them or as large pads that are the size of a mousepad.

Ironically, just as desktop users are beginning to adopt touchpads, notebook users might be moving away from them. An increasing number of high-end notebooks from manufacturers like Gateway and Micron have begun to incorporate pointing sticks amidst their notebooks' keyboards, following the lead of IBM ThinkPad notebooks and their TrackPoint pointing sticks.

Another keyboard and pointing device refinement that is catching on quickly is the scrolling wheel. Many manufacturers are placing tiny wheels on the front of their mice and trackballs

that users can roll to move vertically on-screen through documents and Web pages. Scissors buttons are sometimes used instead, and some companies such as IBM are placing pointing sticks between the buttons of their mice to allow both vertical and horizontal scrolling.

The latest trend involves wireless mice and keyboards. Several wireless devices have hit the market in the past year, and more are eschewing older infrared technology in favor of radio frequency (RF) signals. RF signals transmit across greater distances and with less regard to a device's position or orientation to their receivers than do infrared devices. The freedom of movement that wireless RF devices give users will make them very popular in the near future.

Beyond The Mousepad

So what's on the horizon besides USB connectivity and wireless devices? At some point, speech recognition will become more practical and play a major role in computer input. But until that happens, input device manufacturers will continue to refine the input devices we currently use. Microsoft's IntelliMouse Explorer (pictured above) is a fine example of this. It has an optical sensor on its underside that takes 1500 pictures per second and compares them to see if you moved the mouse. Its digital signal processor (DSP) calculates how far and how fast you've moved the mouse in order to accurately position the pointer on-screen. Since the IntelliMouse Explorer relies on solid-state circuitry rather than plastic moving parts, it will last longer and require little maintenance. This is the type of advancement that we expect to see more of in the months and years ahead. ■

by Chris Trumble

What's OUT

- Input devices with serial connections
- Touchpads for notebooks

What's IN

- Connecting through PS/2 ports
- Ergonomic devices
- Scrolling wheels and buttons

What's UPCOMING

- USB connectivity
- Wireless input devices
- Mice with optical sensors and DSPs

Video & Sound

Innovations To Scorch Your Eyes & Ears



State Of
The PC

Ah, the wonders of multimedia. Without it, a PC is merely a box of boring wires and silicon, used for financial reports and letters to grandma. Video and sound have long been a component of computing, and these elements improve at a torrid pace. It seems that every year innovations in the graphics card industry completely redefine how we look at computers, and improvements in sound technology have made our computers more like home recording studios than stereos.

The following is a glance at the fun side of computing: the current trends in video and sound. We'll also show you what's on the way out and what innovations are waiting in the wings.

Bigger, Better, Faster, More

There are several constants in the cutthroat, rapidly changing field of computer graphics: bigger, better, and faster. The current rage is to slap a staggering 32 megabytes (MB) of memory onto video cards. More video memory means the video card can

process more data more quickly. As little as a year ago, 8MB of video memory was standard, with 16MB a popular alternative. Many video cards on the market still offer 16MB of memory, but the latest crop sports 32MB almost exclusively. There is even talk of at least one video card maker offering 64MB of memory on its consumer level video cards, but that remains to be seen.

Video card manufacturers certainly aren't content to improve their products simply by adding more memory to them, however. The major graphics card companies offer video cards with the latest graphics chips, which are the mini-processors on video cards that are essential to creating jaw-dropping graphics. All of the major graphics chip makers have rolled out new products in the last few months. 3Dfx released their Voodoo III graphics chip, S3 released the Savage4, ATI Technologies has the Rage Fury Pro, and NVIDIA released their well-received RIVA TNT2 chip. All promise super-fast, smooth, incredible-looking video.

Another performance enhancement that is en vogue among graphics card manufacturers is a speedy Digital to Analog Converter (DAC). Last year, a DAC of about 150 megahertz (MHz) was considered top of the line. Now, most video cards have a DAC in the 300MHz to 350MHz range. Users who work or play with intensive graphics on their computers will certainly appreciate the faster DAC.

Anything less than 16MB of memory won't cut it for a video card these days.

It won't be very long at all before 16MB video cards are out, as well. The same goes for wimpy DACs. 300MHz is today's minimum; the 150MHz DACs from a year ago are gone.

Because of the rapidity with which the video card industry changes, it's difficult to predict what awaits us more than a few months in the future. But there is at least one clue about the nature of things to come.

Wrangling Behind The Scenes

NVIDIA, one of the most important players, recently announced its GeForce 256 graphics chip. NVIDIA refers to it as a Graphics Processing Unit (GPU), a processor for a video card. The GeForce 256 relieves the computer's processor of many graphics processing tasks. The GeForce 256 greatly improves the transformation lighting and geometry processing ability of a video card, which should lead to better graphics than have ever been seen in consumer-level video cards. In fact, the GeForce 256 is practically a workstation-level video card made for consumers. The best part? Video cards with a GeForce 256 GPU should retail at less than \$300.

Of course, other companies aren't going to sit back while NVIDIA turns the graphics card industry on its head. They're perpetually at the drawing board, too. S3 announced the release of their Savage2000 graphics chip. The Savage2000 isn't quite as powerful as the GeForce 256, but it will cost considerably less. At the time of this writing, there is no word on what new products 3Dfx and ATI have in the works, but there's little doubt they'll be doing their best to keep up with the Jones'.

The graphics card industry has traditionally been a competitive one, dominated by a handful of video card and

What's OUT

- Video cards: RAMDAC less than 300MHz
- Sound cards: ISA sound cards
- Speakers: basic two-piece speakers

What's IN

- Video cards: 32MB of memory
- Sound cards: 3-D audio
- Speakers: flat-panel speakers, three-piece systems

What's UPCOMING

- Video cards: super-powerful cards for less than \$300
- Sound cards: Even better 3-D audio
- Speakers: four- and five-piece sets

graphics chip companies. ATI, Matrox, Creative Labs, Diamond Multimedia, NVIDIA, 3Dfx, and S3 are some of the major players that have been fighting for market dominance.

As a result of this, we've seen some consolidation in the market over the past few months. 3Dfx bought up video card maker STB, and S3 acquired Diamond Multimedia; both are major purchases. Prior to these acquisitions, both 3Dfx and S3 sold their graphics chips to a variety of video card manufacturers. That is no longer going to be the case. 3Dfx will use STB's resources to sell video cards featuring 3Dfx chips under the 3Dfx brand name. S3 will probably retain the popular Diamond Multimedia brand name, but it's likely they will only sell video cards that use S3's graphics chips.

This consolidation should help stabilize the graphics card market a bit. However, the rate at which new products come into the market will remain high. In times past, we could expect new video card products about every six to nine months. Now, that cycle has increased to new product releases about every three to six months.

What We've Heard

The latest trend in speakers is to ditch the simple, tinny two-piece sets in favor of more powerful three-piece speaker systems. Two satellite speakers sit on your desktop while a powerful subwoofer is neatly tucked away under your desk. A subwoofer greatly improves your computer's audio quality.

In the past, people were discouraged by the higher cost of three-piece systems. However, the cost has dropped over the past few months; Labtec offers a three-piece system for as little as \$49.

Another innovation in speaker technology is flat panel speakers, such as the BW2000 flat panel speaker system from Benwin. Sonigistix also offers a couple of flat panel speakers: the Monsoon MM-700 and MM-1000. Flat panel speakers take up hardly any desk space and often sound even better than the

little cube satellite speakers that come with most three-speaker sets.

Simple two piece speaker sets are still popular, due to their low prices; you can pick up a pair for less than \$30. But with the increasing affordability of



Altec Lansing ACS 54 five-piece speakers

three-piece speakers, the old two-piece speakers are on the way out.

Yesterday's News

USB speakers have also fallen out of vogue. Only months ago, manufacturers of USB speakers promised the technology would make sound cards obsolete; digital sound data would be processed by the speakers, negating the need for a sound card. Consumers, however, never really embraced the new technology, and it appears that the USB speakers' star is fading fast.

Down the road, it's likely that four- and even five-piece speaker systems will increase in popularity. 3-D audio has already fascinated PC gamers, who benefit greatly from four- and five-piece speaker systems. 3-D audio divides sound between the front and rear speakers, which creates the illusion that sound is coming from behind you. And four- and five-piece systems, such as the Altec Lansing ACS 54 speakers pictured above, provide Surround Sound that goes hand in hand with DVD movies. As more people experiment with the PC as Home Theater, four- and five-piece speaker systems will grow in popularity.

The speakers market isn't as cut-throat as the video card market, but it's

still competitive. Several companies are clamoring for your ear. Labtec, Altec Lansing, and Creative Labs/Cambridge Soundworks are tried and true PC speaker manufacturers. But they, along with several up-and-comers like Benwin and Sonigistix, have to compete with traditional audio manufacturers such as Yamaha and Bose.

The Sound Of Things To Come

The most important development in the wild world of sound cards is that of 3-D audio. This technology isn't exactly new, but it is vastly improved. This is due in part to the A3-D audio standard developed by Aureal. Creative Labs also pumped up the sound quality with its own audio standard, EAX.

The development of MP3 has encouraged sound card manufacturers to improve the quality of the software they include with sound cards. Sound cards used to be for games and playing back CDs on your computer. Now sound cards, and the software that comes with them, are turning computers into home audio studios.

Industry Standard Architecture (ISA) sound cards are a thing of the past. Peripheral Component Interconnect (PCI) cards have replaced them because PCI sound cards process and transfer data much more quickly than ISA sound cards. Because of this development, sound cards no longer sport several megabytes of on-board memory. They don't need it. Instead, sound cards now rely on system memory.

The biggest movement in sound card technology seems to be centered on improving 3-D audio. If you move your head slightly to the right or left, you can lose the 3-D effect. This is a difficult problem that will continue to challenge sound card manufacturers.

The sound card market isn't as volatile as the other two markets. There are fewer competitors in this market, and new sound cards appear more slowly than speakers or video cards. ■

by Michael Sweet

Printers

Better Quality & More Functions Arriving In Lower Price Ranges



State Of
The PC

Desktop laser and inkjet printers share a volatile category. Price cuts, performance gains, and added features mean consumers are getting more value than ever.

Speed. Laser printers are getting faster every year. Almost all budget-priced lasers can print 8-12 pages per minute (ppm) while some high-end lasers can scream along at 40ppm. Inkjet speeds have greatly improved, as well. Look for 4-8ppm in lower-priced inkjets, but expect 10-12ppm from the more expensive models.

Print quality. The fundamental measurement of print quality is the resolution, or the number of horizontal and vertical dots per inch (dpi) a printer can produce. Better laser printers can print 1,200 x 1,200dpi, and the best inkjets can print 1,440 x 720dpi. Epson's Stylus Color 660 is presently the lowest-priced 1,440 x 720dpi inkjet (\$129 after a \$30 rebate; MSRP).

Laser printers can even cheat a bit and use software enhancement to simulate 1,800 x 1,200 or even 2,400 x 2,400dpi. However, resolution

numbers alone don't tell the whole story; be sure to check the printer's actual printouts before you buy.

Connectivity. Manufacturers are continually adding connection options to their printer lines. Inexpensive printers may have only a bidirectional parallel port, but newer models may also have a universal serial bus (USB) socket. Climbing the price scale, you'll find wireless infrared ports and network connections, such as Ethernet (10/100Base-T is most common, but 10/100Base-TX is faster), Token Ring, AppleTalk, and LocalTalk.

Consumables. You may think you are saving money by buying a cheaper printer, but you may end up paying more because its ink or toner cartridges are twice as expensive. Check how many pages you should expect from each cartridge and how much each will cost. Try to get 2,500 or more pages from a \$50 toner cartridge, and 550 or more text pages from a \$27 ink cartridge.

Other functions. As digital cameras catch on, more users want to print their color photos without turning on their PC. Users can plug their camera's Compact Flash or SmartMedia memory cards into a Hewlett-Packard PhotoSmart P1100 inkjet (pictured; \$499 MSRP) and print immediately. The P1100 also automatically duplexes (prints on both sides of the page), aligns its ink cartridges by itself, and offers a cancel print button. We'd

like to see these three features more often.

HP also pioneered the useful "send once, print many" technology found in many laser printers with hard drives, such as the Minolta PageWorks 25 (\$2,548 MSRP). This saves you from printing one page and then making photocopies.

Multifunction devices often add copying, scanning, and faxing to an inkjet or laser platform. Look for more new printers that incorporate these or other functions; you can save a lot of money this way by not buying separate peripherals.

Other trends. One of the hottest trends in shared printers is Web administration software. Web administration allows users to securely print documents in the office from miles away, and it lets support personnel control a printer from any Internet access point in the world. This hot technology will probably become standard with many more printers.

Businesses are warming up to the aesthetic benefits of color prints. However, many businesses are avoiding expensive color laser printers for now by buying a premium color inkjet and using it along with a monochrome laser.

Price. We saved the best for last: Printer prices are dropping even as you read this. Some high-quality inkjets cost \$129 or less, such as the Epson Stylus Color 440 (\$99 after a \$30 rebate; MSRP). Look for a fairly decent low-end laser printer, such as the Lexmark Optra E310, to cost about \$399. A quality midrange model is a bit more expensive, such as the GCC Technologies Elite 12/600, which costs \$849 (MSRP). ■

by Marty Sems

What's OUT

- Printers that either do text well or graphics well, but not both
- Printers that can't print on envelopes or card stock

What's IN

- Web administration; multiple functions
- Digital photo printing without a PC
- "Send once, print many"
- \$129 quality inkjets; USB; networkability

What's UPCOMING

- More printers with multiple functions
- Cheaper prices; faster speeds
- Better print quality
- Lower-cost color lasers

Digital Cameras

Get High-Quality Images & More Versatility For Less Money



State of
The PC

The popularity of this ever-evolving peripheral among consumers and business users is sizzling. According to InfoTrends Research Group, digital camera revenues will peak near \$1.2 billion for 1999 and North American sales should be more than 6 million units by 2003. The secret behind these hot sales figures is that manufacturers are continually introducing higher quality models at decreasing prices. The result is a multifaceted peripheral that won't break your bank account. There's never been a better time to buy a digital camera with advanced features and near-film quality images at such a low price.

Today's Advancements

In the past few years, digital cameras have undergone some major changes, the biggest being a vast improvement in image quality. Less than two years ago, the standard resolution for a consumer-based, low-end camera costing around \$500 was 640 x 480 pixels. Cameras in the \$500 to \$1000 price range generally peaked at a resolution of 1,280 x 960

pixels. Today, consumer-based cameras have a common resolution of 1,600 x 1,200 pixels, and on up to 2-megapixel (2 million or more pixels) resolutions.

Other major changes include better camera designs and more manual control. Today's cameras are streamlined and sleek, with smaller frames and contoured grooves. Manufacturers are moving away from plastic lenses to providing models with high-quality all-glass lenses. Nearly all models, even low-end cameras, are including optical and digital zoom capabilities. And some lenses are now able to attach optional wide-angle and telephoto lenses.

In addition, versatility is now popular. Previously, digital cameras weren't conducive to taking action and spur-of-the-moment shots. Today, several models offer continuous shooting and burst modes to give users that luxury. Users also have more control over focus, flash, exposure, white balance, and aperture settings. The Kodak DC265 Zoom camera pictured above, for example, gives users more flexibility by featuring an on-board operating system, universal serial bus (USB) connection, burst mode, zoom lens, and manual control settings.

Increased memory storage is also "in." Early digital cameras only stored images in internal memory, which forced users to transfer images to a PC or delete them whenever the memory was full. Removable flash memory cards have made cameras that only use internal memory nearly obsolete. Last year, most models included 2MB to 4MB CompactFlash or SmartMedia

memory cards. The latest cameras now include 8MB to 16MB cards. Even so, the Sony Digital Mavica cameras, which had the highest sales each month during the past year (according to PC Data), use diskettes to store and transfer images instead of memory cards.

The combination of these advancements presents a powerful, adaptable camera that produces better images at the same, if not lower, price of entry-level models of just a few years ago.

Positive Outlook

The popularity that digital cameras are now enjoying will certainly grow in upcoming years because of new innovations. One of the changes we can look forward to is the increased use of on-board operating systems, which give users the ability to customize their cameras to carry out preset functions. Eastman Kodak and Minolta are two manufacturers that are currently utilizing the Flashpoint Digma operating system. Plus, more models will record audio and video clips, and at a higher quality level than ever before. Also, you'll soon find more cameras with dual memory card slots.

Other future trends will dictate how cameras connect to computers. Using the much faster USB interface rather than a serial cable will become more common, and you'll see an increased availability of removable card readers and writers that attach easily to PCs and transfer images at even faster rates.

Finally, users who have their film developed into digital images on a CD-ROM will be happy to know that, in the near future, they may be able to drop off their removable memory cards and get film photo prints. ■

by Blaine Flaming

What's OUT

- Low-quality images
- Plastic lenses
- Little user control
- Internal memory for image storage

What's IN

- Resolutions up to 2 million pixels
- High-quality all-glass lenses
- Optical and digital zoom capabilities
- Flash memory cards and diskettes

What's UPCOMING

- More on-board operating systems
- High-quality audio and video clips
- Dual memory card slots
- Using USB interface

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Scanners

Now Is The Time To Buy



State Of
The PC

Incredible prices seem to be the explanation behind the current popularity scanners are enjoying with household and business users. This is especially true for flatbed scanner models. There's never been a better time than now to purchase a quality scanner at a lower price.

According to a report released in June by InfoTrends Research Group, one out of every five households that uses a PC also owns a scanner. Consumers are taking advantage of scanners by digitizing film photos and e-mailing them, making reprints, and uploading images to Web sites. In the business sector, scanners are helping to create brochures, presentations, and Web content. InfoTrends predicts that the popularity of scanners will continue to mushroom during the next five years at a rate of 23% in annual sales, reaching nearly 19 million units by 2003.

A Consumer's Market

Quality flatbed scanners can now be found for less than \$100. This news gets even better when you consider that

value-priced models are offering 36-bit color depth and true optical resolutions of 600 x 1,200 dots per inch (dpi).

Flatbed scanners are the current trend primarily because they can easily scan bound documents, such as books and magazines. Several flatbed models are now offering automatic document feeder attachments that can scan transparencies and film negatives. As a result, both sheetfed scanners (which scan loose sheets) and handheld scanners (which require users to move them across a document manually) have been pushed deep into the background. Handheld scanners have moved so far into the abyss that it's difficult to find one for sale in stores; sheetfed models may soon follow the same path.

The popularity of flatbed scanners will probably continue to rise as manufacturers regularly make improvements in design and ease of use. One such improvement is the incorporation of one-touch button functionality, which allows users to bypass the process of using software programs to perform specific functions. Instead, users can easily push a single button to complete such tasks as sending a scan directly to a printer or faxing a scan.

Another improvement that will definitely continue is the increased amount of scanners using a universal serial bus (USB) port to connect to computers rather than parallel ports. USB connections are easier to use and provide faster scan rates than parallel versions. It is also likely that mid-range and high-end models will continue to include a Small Computer System Interface (SCSI)

connection. SCSI connections are even faster, but require users to install a SCSI controller card inside the computer.

Future Offerings

In the future, you can expect to see an increased availability of specialty scanners as well as multifunction devices (MFDs) with scanning abilities. Specifically, look for the digital-imaging craze to catch on more so that models are expressly designed to scan existing film photos, 35mm negatives, and slides. These dedicated models will scan at a higher resolution, produce better results, and thus, provide users with an alternative to buying a digital camera.

The Olympus ES-10 film scanner (pictured above) is an example of a dedicated scanner that will become more popular in the near future because of its ability to digitize images by scanning negatives, slides, film photos, and cartridges of Advanced Photo System film.

MFDs that combine faxing, scanning, printing, and copying into one unit will also probably experience a significant increase in sales as manufacturers introduce more models that feature flatbed scanners with 30- to 36-bit color depth, a 600 x 1,200 dpi resolution, and improved scan rates.

With all of these notable improvements, however, consumers shouldn't expect prices to fall much lower than they already are for entry-level models. InfoTrends predicts that scanner sales will continue to increase, but the overall revenues for manufacturers will level off because of incredibly low prices and increased competition. As a result, manufacturers might begin to back away from bargain models and place more emphasis in other areas. ■

by Blaine Flaming

What's OUT

- Sheetfed and handheld scanners
- Parallel port connections

What's IN

- Flatbed models
- Using USB and SCSI for faster scans
- Optical resolutions of 600 x 1,200 dpi

What's UPCOMING

- Specialty scanners and MFDs
- Prices to level off for low-end models

The Year 2000 Problem

Realistic Guidelines For What To Expect

THE COUNTDOWN to the most anticipated new year in centuries is down to its final phase. With only weeks to go before 2000, we're all starting to really wonder how well the world has prepared for the date that can give computers so many headaches. We talked with Bruce Webster, a leading Y2K expert, about the readiness of the world's computers and what we should expect when Jan. 1, 2000, finally arrives.

FEATURED EXPERT



Name:

Bruce Webster

Company:

**Washington D.C.
Year 2000 Group**

Title:

**Co-chair, independent
consultant**

Facts:

The Washington D.C. Year 2000 Group is the world's largest and most active Year 2000 group, with more than 2,200 members working on the Y2K problem. Webster has testified on the Y2K problem several times before Congress and is the author of "The Y2K Survival Guide: Getting To, Getting Through, and Getting Past the Year 2000 Problem."

SC: *Sum up the readiness of three key sectors within the United States: small business, large business, and the government.*

A: Small business by and large has ignored Y2K. A significant percentage of small businesses have stated that they plan to do no preparation and that their plan is to fix on failure; that is, they will deal with problems as they show up. Most small businesses run on a very tight cash flow basis and if there are interruptions either because of internal problems or external problems, such as suppliers, service firms, things like that, they could be hurt far more seriously than large business.

Large businesses are and have been dealing with Y2K for the last few years. Current estimates are that large businesses in the United States will have spent something over \$50 billion combined on Year 2000 efforts. Even with that, a lot of large businesses were slow in getting started, and while a lot of repair work has been done, they will not necessarily have all the i's dotted and t's crossed by the end of the year. A survey that was released by Cap Gemini in August indicated that 52% of business and government organizations surveyed said they did not think they would have all their critical systems prepared and tested in time.

In government, the administration is giving a very positive message, which isn't necessarily reflected in the information it's releasing. The latest release from the Office of Management and Budget states that 97% of all mission-critical systems in the government have been repaired and tested. The same report, however, identifies 43 high-impact federal programs and of those 43, 36 are listed as not yet ready for Y2K. What they define as ready is that all of the agency's business partners have completed operational testing, so this is now actually integrating all the different components and ensuring that business continuity contingency plans have been developed. We're talking about programs such as food stamps, military retirement, Medicare, Medicaid, federal prisons, unemployment insurance, the U.S. Postal Service, and the air traffic control system.

SC: *How likely are most people to experience a significant, Y2K-related disruption, and how long will it last?*

A: I suspect that probably 50% of adult Americans will experience some kind of impact related to Y2K within the first 30 days of the new year. One category that most people focus on, which I actually think will be one of the smallest areas of impact, is a disruption of services. That means some sort of impact on power,

water, natural gas, [and] transportation—the services and infrastructure aspects that we depend on.

The second broad category is some sort of financial impact. I'm not talking about problems with the banking system because I think the financial sector is actually in very good shape. I mean in terms of having some sort of income you're expecting from some organization, be it payment from a business or payment from a government agency, and having it be delayed. Or, it could be finding yourself suddenly having to spend significantly more for something than you expected.

And the third area, which overlaps the first two a bit, is some form of shortage. This may be that some selected goods in stores are not available, either due to internal production and transportation problems, or more likely, transportation and production problems overseas.

There might also be some sort of inability or significant delay in obtaining some form of service. This can be canceled airline flights, this could be hospitals scaling back on the number of procedures they're doing while dealing with the impact, they can be difficulties in some other particular professional or personal service that your usual supplier is unable to perform because of their own Y2K problems.

SC: *How is preparation outside the United States?*

A: Most foreign preparation has been late and underfunded. It's hard to get independent information on how these countries are doing, but I think we'll see more dramatic Y2K events in other countries. Some foreign countries are actually doing a very good job. The British commonwealth as a whole, commonwealth countries such as the United Kingdom, Canada, Australia, New Zealand, probably have better public awareness than in the United States. A lot of the Scandinavian countries have been very focused on Y2K. Israel, South Africa, Singapore, Mexico have all been doing a great job.

SC: *Reports have spread some horror stories about the readiness of certain sectors, such as electric utilities and hospitals. Are there any specific areas that appear to be a legitimate cause for alarm at this stage, both inside and outside the United States?*

A: If there is one area of agreement, even from the administration, it is that health care is probably the single greatest area of concern. First, the hospitals

were late in their own internal Y2K remediation efforts.

Second, there's still a fair number of biomedical devices that are not Y2K-compliant. By all accounts, hospitals are taking steps to replace or upgrade those, but that also can get very expensive very quickly.

The third problem facing the health-care industry is that Medicaid, and to a lesser extent Medicare, have been behind in their Year 2000 efforts. Many hospitals depend upon those for their cash flow, and if there's any disruption or problem they're going to find themselves in very tight financial straits.

If the hospitals aren't able to complete repairs, they may have constraints on their services. They may put a moratorium, for example, on elective surgery for a period of time. They may limit the number of new admissions to the number they feel they can support with the number of repairs and upgrades done to date.

SC: *We've already passed several dates computers were expected to struggle with this year, such as 9-9-99. How did most computers handle those dates?*

A: By and large, they have gone smoothly, but most Y2K analysts haven't been concerned about those dates. What happened was that very early in the Y2K effort, meaning about two years ago, some of the early analysts said, "we're focusing on the Y2K date, let's make sure we're not overlooking anything else." They compiled extensive lists of every other significant date they could think of. What has been found over the past few years as actual assessment efforts have gone on in organizations is that most of those dates weren't significant. Unfortunately, they have been picked up and used by the media as "here's the next significant event."

SC: *So, a clean record right now really doesn't say much about how we're doing.*

A: No. All that said, my personal feeling is that Jan. 1, at least here in the United States, will be anticlimactic. We have done an awful lot of repairs, spent an awful lot of money. Most organizations plan to have some form of emergency command center in place.

People are braced for some minor form of Armageddon, and that very fact itself is going to mitigate the circumstances. If you went back 12 months, 24 months, and could make Y2K happen on a day there with all the software and devices at what their state of readiness was then, there would have been some real

disasters and disruptions. But we've gotten a lot of work done, people are going to be sort of braced.

The real impact is going to unfold over days and weeks and months. The impact most people will feel will be an impact in economics and convenience, which tend to be closely tied to each other.

SC: *Is it good that American concern about Y2K is generally declining?*

A: Whether or not it's a reason for concern, which is another issue to think about, I think Americans have largely become desensitized to Y2K. Through the media, there have been two messages. One is that there's a small group out there that thinks this is the end of the world as we know it, and the other is that you shouldn't worry, things are going well. What that does is basically present two extremes, the "bump in the road" vs. the "end of the world as we know it."

In my book, I have a range of 11 scenarios numbered 0 through 10. Most of what you hear in the media tends to be scenario 1 or 2 at one end and scenario 9 or 10 at the other. You don't hear a lot of discussion about the types of problems or disruptions mentioned in scenarios 3 through 7, which is where I think we'll actually have the consequences. What happens if gas prices go above \$2 a gallon? What happens if you find that hospitals have to go to a triage basis because they can't support all the patients they normally support? What happens if you're dependent upon unemployment insurance and your check is one week or two weeks late? These are the sorts of impact that can be there and that you should be prepared for.

That's a different preparation than having water and candles and some food for three days, which I happen to think is good common sense anyway. Just about any part of the country you live in, you have good reasons to have emergency preparedness. Y2K is just a good excuse to do it now.

But I don't think that's the impact most people are going to feel. I think most people are going to feel Y2K in their pocketbooks. When I'm interviewed, people often say what are you doing to prepare for Y2K? I say I'm paying off my credit cards. I'm reducing them, deliberately focusing on reducing consumer debt and avoiding new debt and getting myself to the position where the amount of money I have to pay out each month is getting smaller and smaller.

SC: *What's the current expectation for Y2K-related lawsuits? There were huge expectations for that, but we haven't heard a whole lot about them.*

A: We haven't. It's unclear whether this has been restraint on the part of the plaintiff bar, or if they are waiting for what's termed "ripeness." Some of the earlier suits were dismissed because the judge basically said there's been no harm yet. So, a lot of the lawsuits may be holding off until actual Y2K problems occur.

I think

Americans have

largely

become

*desensitized
to Y2K.*

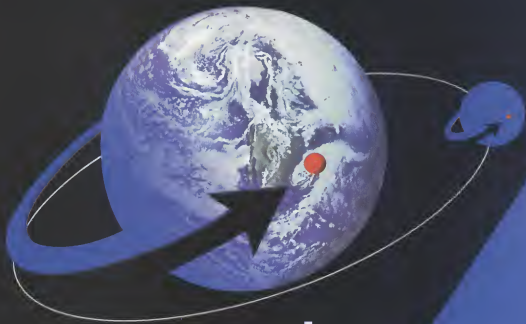
However, there's one trickle that has started that may yet turn into a flood. It's based on a relatively obscure clause in property insurance called sue and labor clause. This clause typically comes in if you have property insurance on your house or your businesses and you know there's a flood coming. You buy sandbags and put up a dike around your property to protect it. If you have the sue and labor clause in your property insurance, it means you can go back to

your insurance company and ask them to pay you for the sandbags because you saved a claim and it's a lot cheaper than having to pay for the actual damage that would have occurred. Three big companies to date, GTE, Xerox, and Unisys, have filed lawsuits against their property insurance carriers wanting full reimbursement for their Year 2000 remediation on the basis of this clause. This is saying, hey, there was damage ahead. We spent \$100 million to avoid it. We'd like that money back.

This is a novel interpretation to say the least, and one the insurance companies feel has little merit. But here is why this threatens to go from a trickle to a flood. If I'm on the board of directors of Corporation X and I know about this lawsuit and my company has spent \$100 million on Y2K remediation, if I don't file a claim with a potential supporting lawsuit to get that \$100 million back, some other law firm purporting to represent shareholders may come after me for lack of fiduciary consideration for the corporation.

It's almost self-defense, and there are some indications that these three are just the beginning. No one really foresaw this, but it might end up being the first really massive wave of Y2K lawsuits. ■

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Usually when you click a subcategory button, a new bar appears with a Search box and a drop-down list. The Search feature is self-explanatory and universal, but the contents of the drop-down list vary among categories. In the Books section you'll see entries such as Business, Horror, and Travel, while the Electronics area has Camcorders, Phones, and Gadgets. Still, the search feature lets you dig deeper into a particular category.

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A Walkthrough

Let's take a look at ordering a book on Amazon.com. Because the different sections are similar in design, this example will give you an idea of how to buy other items. Let's buy a book for a friend who likes hard-boiled detective fiction. Last time we talked, he had just finished reading the complete works of Raymond Chandler and he's now looking for books by an author with a similar writing style.

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Now you are on a page that lists information for this particular edition of "The Maltese Falcon." On the left you'll

see a list of main links leading to further information about the book. When you click Reviews, you can see that the Amazon.com editors compare Hammett favorably to Chandler. *The Merriam-Webster Encyclopedia of Literature* gives more information, saying most critics consider "The Maltese Falcon" Hammett's masterpiece.

Everything sounds good so far, so click Customer Comments to see what readers have to say. Nineteen readers submitted comments about "The Maltese Falcon," giving the book an average rating of 4.5 out of 5 stars. If you want to read all of the customers' comments, simply scroll down the page.

Another feature we liked is the Read An Excerpt link. Read a few paragraphs or an entire chapter to see if the book has any appeal. Based on what we've found here, it looks like a Chandler fan would like "The Maltese Falcon," so now it's time to buy.

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Amazon.com is a veteran of e-commerce, having been around since 1995. Founded in Seattle, Wash., as an Internet-only bookstore. It expanded to new areas, but its focus is still books.

You cannot order by telephone. That keeps prices down and doesn't adversely affect sales; it claims to have 10.7 million customers in 160 countries. Amazon.com

is well-known for selling products, especially books, for less than retail. The *New York Times* hardcover best-sellers are always 50% off, and most books are sold at a 20% discount. This, along with the fact that most customers do not have to pay sales tax, defrays shipping costs. Amazon.com offers low prices mainly because of the leverage afforded by a \$30+ million inventory.

The company is not profitable yet, although Amazon.com is the number one shopping site, according to Media Metrix, with nearly 11.5 million different visitors in July 1999. The lack of profitability didn't keep founder and CEO Jeff Bezos from achieving multi-billionaire status after the company went public in 1997. ■

Before moving on, other features of the Books section merit discussion. If you hear of a book on television, the radio, or from the print media and want to buy it, follow the "Featured in the Media" link from the main Books page. Books discussed in *People* magazine, *The New York Times Book Review*, National Public Radio's "The Book of the Nation," and other shows, newspapers, and magazines are listed here. Similarly, the "Award Winners" section lists books that received a National Book Award, Nobel Prize, Hugo Award, Pulitzer Prize, or other honor.

Visit the main page often; it's constantly updated with links to reviews, interviews, and interesting articles.

Other Highlights

Music. The other sections of the site also contain unique features. In Music, you can listen to audio clips from the Free Downloads link near the top of the page or by selecting Download in the Free Song Downloads box.

After you've bought some CDs, Amazon.com will make recommendations based on your past purchases and preferences. Click the Recommendations Center button near the top of the page to use the service.

Video. The Video portion of the site has a similar service, and it's accessible through the Awards & Recommendations link. As in the Books section,

there is a 10 Under \$10 link, leading to low-priced new merchandise.

Toys & Games. Parents know how expensive toys are, and the Toys & Games section includes a link to products under \$20. The browsing options are outstanding because you can browse by age range. You can browse by category, but it's nice to click an age range and see products designed specifically for kids of those ages.

Amazon.com didn't stop there; you can browse by brand or follow the Characters & Interests link to track down toys related to a favorite superhero, movie, or television show. This feature lets users shop for toys based on a child's interests, such as dinosaurs, trains, or sports. It is hard to imagine an easier way to find a perfect gift without actually taking the child to a toy store.

Electronics. Electronics seem out of place here despite items ranging from radios to computer peripherals. Prices are decent, often below retail, but visit sites devoted wholly to electronics first.

Some promotions are worthwhile. When we visited, Amazon.com offered free shipping on all big-screen televisions, 30 inches or larger. Still, this is the weakest stream at Amazon.com.

e-Cards. Don't miss Amazon.com's e-Cards. We couldn't decide which was better: the well-designed cards or the fact that they're free. Most free electronic greeting cards are downright ugly, but that term applies to few cards here.

You'll find standards, such as birthday, anniversary, and get well cards, and Amazon.com introduces special cards for the holidays. Users can add customized messages, and nearly every card is animated. Amazon.com e-mails the recipient a link that leads to the card. The entire process is simple and fast, and you can't argue with the price.

Another free service, Special Occasion Reminders, is available on the e-Cards page. You can enter information about an upcoming event, such as a birthday, and the service e-mails a reminder as the date nears. If you provide optional personal details about the person you're getting reminded of, Amazon.com creates a list of gift suggestions (all available at its site) that are included with the reminder e-mail.

Auctions. The Auctions section differs tremendously from the others. Nearly every online merchant offers auctions, and at Amazon.com, users can bid on everything from jewelry to computer software. Online auctions, such as eBay (<http://www.ebay.com>), offer a much larger selection. Amazon.com's auction site is, however, a great place to look for used and rare books. If history is any indicator, it should grow phenomenally in the coming months.

zShops. Amazon.com announced as we went to press that it intends to let retailers and individuals sell products through its new zShops service. For information about commission and fees, see Amazon.com.

Go With The Flow

A few minutes at Amazon.com proves the company wants to sell more than just books. At the rate services are added, we wouldn't be surprised if future customers can order fries with their books. As Amazon.com continues to form partnerships with sites, such as the Internet Movie Database and PlanetAll.com it's inevitable that the company will become as dominant a force in entertainment as it is in online sales. ■

by Tracy Baker

Rest Your Feet At Shopping.com

Check Out This Site For The Best In Electronics & Entertainment Items



Shopping.com maintains a consistent template throughout its site, showing the same Superstore tabs and site links on its Web pages.

As more merchants post their goods online, it becomes easier for would-be consumers to drown in the deluge of products for sale on the Web. Even if you know what you want, sometimes it's difficult to sift through all the online stores that offer it. When we typed "shopping" into the search tool on the GO Network, the search retrieved almost 4 million "relevant" sites for us to browse. That's like having direct access to every mall in the world.

A few online malls have emerged to help customers research products, find the wares they want, and buy items from different vendors all at once. One of our favorites is Shopping.com.

Shopping.com is an incredibly easy-to-browse site. A consistent template throughout the Shopping.com Web

pages ensures that important links appear in the same places on each page. For instance, from any Shopping.com page, you can click the AltaVista.com link to go to the AltaVista home page, the Shopping.com link to reach the Shopping.com home page, or the Advanced Search link to search the entire Shopping.com Web site.

This Advanced Search feature offers plenty of options. Users fill in the blanks with the information on the product they seek, and Shopping.com searches its database. For example, when shopping for a specific book, you can enter the book's title, author, keyword, or International Standard Book Number (ISBN), and Shopping.com comes up with a list of relevant leads.

The part of the site you'll likely use most often, however, is the beige left column, which holds the majority of Shopping.com's shopping links. Here you can access links such as Advertised Specials, Seasonal Specials, Best-Selling Games, NY Times Bestsellers (at half price), and Billboard Bestsellers. When you jump to a specific category, it lists subcategories. You'll find links to Shopping.com's major stores, and, of course, AltaVista sites and services. "We're tied in pretty closely with AltaVista, which gives us a lot of their search capabilities," says Mark Steinberg, director of retail stores at Shopping.com.

TIPS ... For Using Shopping.com

If you accidentally click the Buy! button while viewing a product, you can easily delete the product from your shopping cart. The site displays a tally of all the items in your cart. Next to the price you'll find a Delete box you can check to cancel that item from your shopping cart.

To compare shipping costs when viewing your shopping cart, click the circle before each of the three shipping options: 1 Day, 2 Day, and Economy. As soon as you

click the shipping option, click the Update Total button to have Shopping.com reconfigure your charge. You must input your ZIP code before this will work.

You can request to have the tracking information on your order(s) e-mailed to you so you'll know when the item actually starts its journey through the mail. Click the Order Tracking/Shipping link near the top of a Shopping.com site and input your e-mail address.

If you forgot your password for your Maximizer Account, Shopping.com will e-mail it to you. Click the Maximizer Account link near the top of the home page, then click Recall Your Account and input your e-mail address.

When you click the Contact Us link at the bottom of the Shopping.com home page, you can send an e-mail to the department you seek. E-mail the Billing, Cancellations, Commcenter, Entertainment, General Information,

International Sales, Orders, Order Status, Pre-Receipt, Products, or Product Information departments.

If you give someone a Shopping.com gift certificate, remember to pick a password the recipient won't forget. It won't matter if you can't remember it; you'll never need to type it in. The recipient, however, has to enter the password every time he or she redeems part of the gift certificate. ■

Shopping.com relies on AltaVista's research function to achieve one of its primary goals: educating the consumer. "Shopping.com really wants to help customers in their buying decisions. We want to provide consumers with the educational background so they can research the products they want to buy," says Ginger Hernandez, public relations representative.

By clicking the AltaVista.com link, shoppers can read about the products through one of the Web's top search engines. In addition, Shopping.com makes product research available within the online mall itself. For example, shoppers can browse book reviews before ordering a book.

Merchandise

Shopping.com offers more than 500,000 products from about 50 vendors. (This may seem unfeasible, but books and music products make up the majority of those products.) These products are divided into more than 400 categories. When you order a product, Shopping.com sends the order to the appropriate vendor, who ships the product to the consumer.

There are seven tabs at the top of the Shopping.com site, which link to the seven Superstores. The Superstores are Computer Hardware, Computer Software, Home Electronics, Books, Music, Movies, and Video Games.

You'll notice a large absence in the areas of clothing, furniture, groceries, and several other categories. Shopping.com purposefully omitted those categories, deciding to focus on its consumers' specific wants. "These are the areas in which consumers are interested," Hernandez says. Shopping.com doesn't want to become a comprehensive site with near-dormant categories consumers don't care to see, Hernandez says, which is why Shopping.com abandoned its Ultimate Brands Auction and Gifts and Home Superstores.

Each Superstore excursion begins with a Web page featuring a half dozen Featured Buys, one or two with a photograph and description. At the base of

the Superstore pages looms a link to each Brandstore. In addition, each Superstore page contains advertising.

On the lower half of the left column of the page you'll find clickable subcategories in each Superstore. For example, Computer Hardware contains more than two dozen subcategory links such as Accessories, Laptop Computers, Modems, and Monitors. Each one takes you to another set of links to help you specify the product you seek. Each time you click, you'll be bombarded with several Featured Buys.

Some Superstores offer better deals and more comprehensive warehouses than others. We especially felt like bargain shoppers in the Books section, where consumers can buy half-price New York Times Bestsellers.

Shopping Cart

Like most online shopping sites, Shopping.com offers an electronic shopping cart feature to "hold" your purchases. Customers can fill the cart with goods as they browse the site and pay for them all at the end of the visit. Each time you click the Buy! button next to a product, Shopping.com sends you to look at your cumulative shopping basket. You can continue shopping just by clicking a category tab.

Shopping.com's Ultrastore now requires a customer's ZIP code before the customer gives the nod to go through with the order. This lets Shopping.com display the cost of the merchandise plus shipping. You can choose from 1 Day, 2 Day, and Economy delivery. Shopping.com adds your choice to the total bill before you confirm the sale. If the price is higher than you anticipated, you can delete some items or select a less expensive shipping option.

You won't be charged until your items ship, and Shopping.com tries to predict the processing time for you. The products mail in the number of days indicated. Exceptions include back-ordered items, which are sent to those who ordered first within two days of when Shopping.com gets them in stock. Special-order items ship

within a time frame listed in product descriptions. Shopping.com offers online order tracking so you can check to see where your order is in the process.

At checkout, Shopping.com offers cross-category recommendations to buyers for similar products or items Shopping.com thinks enhance the ones a buyer is ordering. These "great values you may have missed" are supposed to enhance or match the current buy list. But when we placed a test order for a television and bookcase, Shopping.com suggested we add Microsoft FrontPage 2000 for Windows.

When you're ready to pay, you can use a credit card, check, or gift certificate/coupon. Shopping.com accepts major credit cards such as Visa, American Express, American Express Optima, MasterCard, and Discover.

Special Programs

Maximizer Account. To reward repeat customers and incite first-timers to become return shoppers, Shopping.com offers Maximizer Accounts. To open a Maximizer Account, you simply

Within the Shopping Cart, you can delete items, choose a shipping option, and select a payment type.

input personal information, including name, password, billing and shipping addresses, contact information, payment method, and credit card number.

Shopping.com offers you special deals when you become a member. Now that the Web site has your personal information, you won't have to enter it every time you shop. The Value Maximizer saves buyers up to 65% off

SHOPPING.COM Fact Sheet

Shopping.com launched in Nov. 1996 in Corona del Mar, Calif., and in March of this year the company relocated to Irvine, Calif. Compaq Computer Corp. bought Shopping.com in February for \$18.25 a share, or \$181 million, and placed it into

its AltaVista division. In mid-August, Compaq sold 83% of AltaVista and its subsidiaries to CMGI Inc.; Compaq still owns 17% of the online network.

Despite this fast-paced history and multiple owners, Shopping.com has continued to grow.

Between January and September of this year, Shopping.com had 400% more unique users than it did between January and September of last year. During that same time, Shopping.com has experienced a 1,000% increase in sales. ■

of list prices of specific goods. A periodic e-mail newsletter informs members about the latest happenings at Shopping.com. Members also have access to Extreme Deals, which are good steals, but we found they're often accessible at those prices elsewhere on the site.

The most advertised perk of the Maximizer Account is MaxDollars. Members receive one MaxDollar for every \$100 they purchase. The more MaxDollars you collect, the more of a discount you'll get on your next purchase at Shopping.com. To collect MaxDollars, simply select Maximizer Express Checkout as the form of payment on the checkout page. While MaxDollars might seem like a good incentive, they only amount to a 1% discount. Even if you spend a hefty grand, you'll only be rewarded \$10 to use with another purchase. If you plan to be a repeat Shopping.com shopper, however, every bit of savings helps.

We think the best incentive to become a Maximizer Account member is that once you input your shipping, billing, and personal information, you won't ever have to do so again. The next time you make a Shopping.com purchase, enter your password or username and the company remembers you and your information. "What we're doing with our Maximizer Account is streamlining purchases, making them one-click available," Steinberg says.

To join the Maximizer program, click the Maximizer Account link near the top of all Shopping.com pages. Once you're a member, you can update your personal information,

including your username, password, billing and shipping addresses, contact information, and payment method. To update the information, you must type in the account number or username and password. If you have forgotten your password, Shopping.com can e-mail it to you.

Gift Certificates. You can buy gift certificates in \$1 increments of \$10 or more. The buyer can include a message to be sent to the recipient. The buyer sets a password for the gift certificate account, which will be required to redeem the certificate later. Shopping.com will e-mail the recipient as soon as it processes the order. The recipients never receive a tangible gift certificate. Instead, they use the e-mailed voucher on Shopping.com to purchase as many items in as many visits as they choose until that certificate's funds are gone.

Advertising

While many online search engines and malls restrict their vendors to paying advertisers, there is no charge for most companies to have their products listed on the Shopping.com site.

Brandstores, however, do pay money. Brandstore Connection links branch off to about 10 companies' wares. Click the company to reach some of the items it offers. Although the Brandstores reside under the guise of helpful shopping links, we found the superfluous pasting of their names and logos throughout the site annoying and the scant quantity of products they actually offer disappointing. Most of

the Brandstores have much more comprehensive sites of their own.

Customer Service

Shopping.com boasts as good a customer service policy as we have seen. It begins at the base of every Shopping.com Web page, where you'll find a Contact Us link. When you click this, you'll access numerous ways to contact a Shopping.com representative.

The Help section of the site is also top-notch. You'll find the link on the bar underlining the seven Superstore tabs. At the top of the Help page you'll find Shopping.com's Customer Service Policy. Beneath this are 16 helpful customer service categories to click. Next, you'll see clickable Help index categories, which include everything from how to find a product to where to read customer comments.

Shopping.com also offers customers a 125% satisfaction guarantee. The company refunds an unhappy customer's money and offers a gift certificate for 25% of the original item's purchase price to be used for future purchases on Shopping.com. "One of the things people shopping online are afraid of is being satisfied. We want to guarantee they'll have a good experience," Steinberg says. Luckily for the company's budget, Steinberg claims it doesn't have to utilize the guarantee often.

Also, if your credit card number is stolen online while purchasing from Shopping.com, the company will reimburse you for the money lost and not covered by the credit card issuer. You must report the theft to Shopping.com within 60 days. "Theft is almost impossible," Steinberg assures consumers. He states that Shopping.com has never had a credit card theft problem.

While Shopping.com's main goal is to sell products and make money, it understands that to do so, it has to keep the customers happy. With great navigability, excellent customer service, and a large selection, Shopping.com has become an e-commerce trendsetter. ■

by Michelle Nelson

Web Tips

Ideas That Make The Most Of Online Time



Someone Else's Money

The Fantasy Stock Market (<http://www.fantasystockmarket.com>) lets you buy from more than 25,000 stocks offered on the U.S. markets and exchanges. Get a few friends and co-workers together and form an investment club. Sign up to compete against other investment groups for a month. Fantasy Stock Market provides current stock news and quotes, a tracking service for your portfolio, and valuable investment tips. Best of all, it's free to sign up and play.



SpringStreet.com

Looking for apartments long distance can be a hassle, but doing an online apartment search at SpringStreet.com (<http://www.springstreet.com>) couldn't be easier. Click the Begin An Apartment Search link to narrow your search of the more than six million apartments in SpringStreet.com's database. Stipulate the city to which you are moving, date you want to move-in, range of rent you would like to pay, and features you expect the apartment to have, such as a washer/dryer hookups, fireplace, and private balcony.



Investment Scams

Nestled among the other offerings at Microsoft's Money

Central is a list of the Top 10 Scams Of The 90s of which investors should be aware. Go to <http://moneycentral.msn.com/articles/smartbuy/specials/scams.asp> and read about Self-Employment & Work At Home Scams, International Investment Fraud, Exotic Scams, Affinity Fraud, and more. Many of the explanations also provide

day. On the home page (<http://www.intelihealth.com>), scroll down to Health Resources on the right side and click the Deskercise link. The featured exercise changes daily, and you can do it right at your desk. Click links to Neck, Shoulders, Hands/Wrists, Back, Legs, and others for more specific Deskercises.



A Fine Furniture Fit

Your spouse is not convinced that the living room needs the recliner with the cooler built into the armrest. Prove your point at



Visit IntelliHealth for the daily Deskercise that's designed to help stretch muscles that don't get much use when you're sitting at a desk all day.



Sit & Stretch & Flex

Sedentary desk workers never seem to get enough exercise. We squeeze it in over the lunch hour or for an hour after work. The rest of the day, our neck muscles tense, back muscles throb, and headaches pound away. Give IntelliHealth's Deskercises a try for a little relief from the stress of the



A Picture Of Snow

Before leaving for your holiday ski trip, check the Ski & Snowboard Reports at Excite.com (http://www.excite.com/weather/ski_reports). You can enter the resort area by name into the search field; scroll down the list of United States resorts, which are listed by state; or scroll through the list of International resorts, which are listed by country. See pictures of the area, get a report on the snow base, current slope and wind conditions, and whether new snow is in the forecast. Some of the resorts also have links to their home pages for information on elevation, lifts, trails, and other available services.



Let Your Mouse Do The Walking

Suppose you heard of a product that you knew was produced by a company in Europe, but didn't know how to contact the company; you now have an online helper in EuroPages (<http://www.europages.com>). EuroPages is an online directory listing of 500,000 businesses in 30 European nations, and you can perform searches in any of six languages. You can search by product or company name, or if you're looking for a company that offers specific goods and services, you can search specific categories, such as Banking & Finance, Business Travel, and Food & Related Products. ■

Furniture.com's Room Planner (<http://www.furniture.com/roomplanner>). Plot your room on the grid. Import the furniture currently in the room; adjust dimensions until you have the furniture, entertainment center, bookcases, and plants exactly as they are in your house; now see if you can accommodate the recliner. Then place the recliner in the room and print it out to show your doubtful spouse.

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Learn how to set up a Web page, add a background, create a hypertext, add a plug-in, and audio and video files, plus more. (146 pages)



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Step-by-step instructions show you how to design, set up, and generate a successful Web site. Plus secrets to promoting your site for free. (160 pages)



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Use the Internet to find work in any state and in other countries, research and develop your career, advance potential employers, plus much more. (146 pages)



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Curing The Web Printing Woes

Use These Tips, Tricks & Tools To Make Printing From The Web Easier



IT NEVER FAILS. When you finally find a Web site with the information you've been looking for, you're sitting in an airport miles away from your printer. You save the Web page's universal resource locator and open it as soon as you arrive at the office so you can print it. Alas, the Web site has changed for the worse.

Too bad your office didn't know about the Internet Printing Protocol (IPP) or InternetPrint. You could have sent the Web page to your printer as soon as you saw it, and the printout would have been waiting for you when you came in to work. This is just one of the tricks that lets you put the content of the Web on paper.

You'd better catch up on your printer knowledge. Printers can now produce Web pages on paper that look almost as good as they appear on-screen. You can specify

which parts of the Web site to print, change the font and color, reorganize pages onto the same sheet of paper, print pages without opening them, and program your printer to retrieve your favorite news. And you can use IPP or InternetPrint to print a Web page at any time, in any place.

Web Printing Basics

The quickest way to print a Web page is from your browser. We'll show you the basic steps through both Microsoft Internet Explorer and Netscape Communicator.

Internet Explorer. To print a Web page in Internet Explorer 4.0, Select File, Print. In the Print dialog box, use the Print Range area to specify whether to print specific pages, the highlighted selection, or the entire Web page. The Print Frames box lets you print the site's frames as they appear on your screen or individually. You can print documents that link to the Web and/or a table of the links. Under File, Page Setup, you can change the margin sizes or opt for landscape or portrait pages.

Netscape Communicator. Netscape Communicator 4.61 offers many of the same options for Web printing. Select File, Print. The Printer, Print range, and Copies boxes look like Internet Explorer's. Communicator also lets you print the entire Web site, specific pages, or a selection. Click the Properties button and you'll find a range of options that vary according to your printer. You'll probably be able to select landscape or portrait page printing, print multiple Web pages on one sheet, and alter the printout's darkness. Under File, Page Setup, you can choose header and footer information.

Is It Art Or Service?

With software spanning multiple browsers, Web users can specify which parts of numerous Web sites they want

to print, add pieces of other non-Web applications, change the font and color of text and graphics, and print it all as one document. Software can retrieve Web pages offline at certain time intervals and print Web sites the user hasn't even opened.

Computer printer manufacturers Hewlett-Packard Co. and Canon Inc. both offer Web printing software packages, PrintSmart and WebRecord, respectively, that offer users plenty of options.

PrintSmart 2.0 Plus. Hewlett-Packard's PrintSmart 2.0 Plus lets users gather all or pieces of multiple sites, e-mails, text documents, and graphics and organize them onto one document. You can arrange the parts onto an automatic template and even omit the graphics and page breaks before printing. In addition to printing the information, you can e-mail the PrintSmart application you have created or post it to the Web or a network. With the scheduled printing function, you can program your printer and computer to retrieve and print specific Web pages at designated times, such as the daily newspaper every morning.

PrintSmart requires Windows 95, Windows 98, or Windows NT 4.0. The program works with Windows-based printers. PrintSmart 2.0 Plus costs \$29.99 to download from the Hewlett-Packard PrintSmart Web page at <http://www.hp.com/pond/wps/index.html>. A less-complex version, PrintSmart 2.0, does not include some of the features of PrintSmart 2.0 Plus, but you can download PrintSmart 2.0 for free from HP's site.

WebRecord Pro. Canon's WebRecord Pro keeps track of the Web sites you've visited and keeps them in a running list for you to access later. It can update your saved print list URLs to register any changes to the Web site. When you're ready to print, you can go into the print list and check the sites you want to send to the print queue. WebRecord also offers many formatting options. You can alter the color and graphics of the document, rearrange or omit parts of the Web pages,

and even divide the document into two or three columns. You can slim down, omit, or rearrange graphics and text so they fit on a sheet of paper.

WebRecord requires Win95, Win98, or WinNT 4.0. It works with most PC-compatible printers, and it has an estimated street price of \$49.95. You can find more information about WebRecord at <http://www.software.canon.com>. You can download WebRecord Lite free from the Canon Web site at <http://www.webrecordsw.com>.

A Network Of Online Printers

In addition to printing Web pages, you can use the Internet to send non-Web documents to a remote printer. Two groups, The Printer Working Group and Nadio Inc., have created ways to print from almost any location as if you were sending a fax. Both the printer and print job sender must be registered with the same Internet printing program.

Internet Printing Protocol. IPP lets users print information to a remote printer over the Web. Established by The Printer Working Group (<http://www.pwg.org>), the IPP project lets any Internet-connected browser print to an Internet-connected IPP printer through the printer's Internet Protocol (IP) address. The process begins with an IPP client PC. The client sends a print job to an IPP printer's Web address.

The future of IPP looks bright. Although the percentage of printers today with IPP capabilities is small, The Printer Working Group expects that number to skyrocket within the next year, with print servers and small plug-ins for older printers, and new printers with built-in IPP. Windows 2000 and most of HP's JetDirect line of print servers will support IPP. Developers are devising ways IPP users can configure an IPP printer over the Web and check the status of their print jobs online. However, IPP's future depends upon the Internet Engineering Task Force, which must approve the IPP.

Nadio InternetPrint. Similar to IPP, Nadio InternetPrint lets users send a

print job to any printer set up with InternetPrint software. The user selects Nadio InternetPrint from the list of printers within the Print window. Next, the user specifies that printer's location name, e-mail address, IP address, or universal resource locator. Some print job recipients may also demand a password for access to their printer. Users can then fill out a cover page to accompany the print job.



Canon's WebRecord Pro keeps a running list of printable Web pages that you can access later.

desired printer isn't online to accept print jobs. At that point you can create a temporary folder for the print file and schedule InternetPrint to send it again after a specified amount of time. If InternetPrint still cannot reach the printer, it will e-mail the document. If InternetPrint does not know the e-mail address, it will delete the job.

To send or receive a document through InternetPrint, you must have Win95 or Win98. WinNT 4.0 can only receive jobs. You can download InternetPrint Lite 1.0 for free from Nadio's Web site at <http://www.nadio.net/iprint/index.html>.

Technology has graced us with impeccable printers and an amazing wealth of information available online. It has taken developers almost a decade, but they've finally combined the two. ■

by Michelle Nelson

Y2K's coming. Don't just sit there.



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Y2K is headed your way and how much damage it does to your important files and applications is up to you.

So be smart and get prepared. With Iomega's Y2K Software Suite, getting help is as easy as 1-2-3.

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iomega

Contact Management

**Choosing The Right Software
To Keep Up With Your Customers Depends On Your Needs**

IN TODAY'S COMPETITIVE MARKETPLACE, it's not enough just to put a name with a face. Top producers need immediate access to a customer's key details, everything from contact information to a complete order history. Fortunately, contact managers help you automate such information, organizing and streamlining the sales process for companies of any size.

Today there are more than 100 contact management software titles on the market, and choosing the right one for your operation is no small task. A good starting place is to decide which of the three types of contact managers best suits your needs.

Personal Information Managers

As the name implies, personal information managers (PIMs) focus on the individual user. Nearly all features revolve around five central functions that govern a person's day-to-day doings: calendar, contacts/phone book, task/to-do list, memo pad, and e-mail. Microsoft Outlook and Lotus Organizer are good examples of PIMs.

Few salespeople operate in a vacuum. Often, members of a sales workgroup need convenient access to each other's schedules to plan meetings. Even in the absence of a workgroup, managers value being able to survey their employees' activities. Hence, many PIMs now offer the ability to share member schedules, either over a local-area network (LAN) or the Internet. One user can peek at another's calendar, find an opening for a meeting, then e-mail an invitation. If the user accepts, the PIM program sends a confirmation back to



the first user and accordingly updates both calendars.

Knowing that the Internet is becoming more important to salespeople, the forthcoming Lotus Organizer 6.0 will integrate several new features optimized for the Web. (In fact, a new navigation tab, Web, will be the first new tab in Organizer since version 2.0.) These features include a URL account manager for storing usernames and passwords at commonly visited Web sites, the ability to post calendars and contacts to the Web, a link to MapQuest for obtaining directions to a customer's location, and Hypertext Markup Language (HTML) support in Notepad. This last

feature allows for the easy storage of items such as e-commerce receipts or the results of a Web survey.

Although the focus of Outlook and Organizer is still decidedly user-centric, more and more operations are becoming integrated with the contact database. Both products can launch phone calls, obtain travel directions, and send meeting requests from a contact's record listing. Outlook has one advantage in being able to initiate a NetMeeting video conference from a contact record. With Organizer, it's easier to log and associate phone calls with contacts. These types of features blur the line between PIMs and true contact managers, such as ACT!

Lotus Senior Product Manager John Ellsworth stresses that while Organizer will continue to expand its network feature integration, the product will primarily continue as a powerful PIM. "Essentially, we've positioned [Organizer] less as the full, robust contact management that a sales professional needs to automate everything they could possibly ever do with a customer and more as real-world contact management for the masses. The essence of [Organizer's type of] contact management is giving you flexibility in what kinds of information you want to store about a person and [then] giving you one

place where you can see all of the information that relates back to a specific person. We didn't design a program where only 20% of the functionality was used 80% of the time."

For many users, especially small office/home office (SOHO) professionals, the relatively limited functionality of a PIM may be sufficient. Sole proprietors may not need or want to pay for the analytical and automation tools found in more advanced software. But for those who require more than the five basic PIM functions, true contact managers may be the solution.

Contact Managers

According to Symantec's Dwayne Vanderhorst, a contact manager should offer certain essential features: the five basic PIM components, integration with phone and faxing, searchable data, the ability to manage groups of contacts within an organization, and an easily customizable interface. Vanderhorst should know; ACT! was the first program to define the contact manager genre, and the title is still the largest seller in its category.

One of the greatest advantages a contact manager has over a PIM is the ability to maintain an extensive log of every type of interaction conducted with a contact. PIMs excel at making e-mail histories accessible, but what about letters, faxes, phone calls, and even comments made at meetings? Contact managers let you track all of this and more by linking huge amounts of information to the individual contact's record. This level of tracking is necessary to maintain a complete picture of a customer account and to help build a firm personal relationship.

Further, a contact manager more tightly

integrates a PIM's five core functions. For example, because to-do and calendar items are typically generated from within the context of a certain contact, clicking such an item will bring up that contact's record, so associated information is nearby. Similarly, some applications have the ability to correlate things such as calendar and to-do events, making one item show up under both views, eliminating the double-entry process that plagues most PIMs.

Perhaps the primary difference between PIMs and contact managers is the latter's emphasis on automating the sales process. With ACT!, the premise is that every sale begins as a tentative, or more often unqualified, lead and proceeds through a series of steps that hopefully results in a final sale. At each step, there is a certain probability of a sale closure and an estimated amount of sale dollars; for example, upon receiving an encouraging call-back, the user expects a 60% probability of

closing a \$500 sale. Similarly, sale losses occur in varying amounts at most steps.

By analyzing these numbers over time, users can use the software to chart trends and form sales forecasts. By the same token, statistics will reveal at which step or steps a sale is lost, indicating an area that needs refinement. In addition, ACT! 2000 has integrated Dale Carnegie's 11-step sales methodology as the default step sequence, but users can customize these or generate an entirely new process. ACT! 2000 also integrates additional Dale Carnegie sales tips that coincide with the step sequence.

Another popular contact manager, Multiactive's Maximizer 5.0, lacks ACT!'s forecasting and trending abilities, but instead focuses on developing sales through e-commerce. Using the program's MARKET-builder wizard, users can construct an Internet storefront literally in minutes and post it either to their own Internet service provider (ISP)

What To Look For In A Contact Manager

A contact manager can help you keep tabs on all your customers, but with so many on the market, what should you look for? We've put together five key points that should help you narrow down your choices.

Ease of use. The most expensive, comprehensive contact manager in the world is worthless if no one uses it. If salespeople find it inconvenient or confusing to enter data, the entire database will suffer, as will any analyses the software performs. Powerful functionality must be masked by a simple, intuitive interface.

Customization. Every company (in fact, every user) has different needs and preferences. Most contact

managers are generic out of the box, but the most powerful ones let you modify everything from the fields associated with contacts to the basic display layout.

Security. Nearly all contact managers allow for at least the exchange of scheduling information throughout a workgroup. As sensitive data about key clients is shared, however, the need for security increases. Companies should take care to ensure administrators can password-protect and assign access rights to each user.

Import/export. Salespeople use a variety of software, including word processors, accounting systems, databases, and Web

browsers. To maximize efficiency, a contact manager should integrate and exchange information with the key applications on which a user depends. This also includes sharing data with handheld devices.

Scalability. If you plan on expanding your company, consider whether your contact manager will accommodate 15 people as easily as five. How well does it handle access and data transfer with remote sales staff? Also, if you need to add extra functionality not found in the standard version, is there a wide base of third-party add-on modules? In short, you need a contact manager that can grow with your business. ■

or to Maximizer's BusinessNet Web server, where Multiactive will host the site at no charge.

When visitors place orders or inquiries at the site, the customer's information is sent back to the user and into Maximizer's E-mail Center. Then the information is appended to the address book with attached notes about the visitor's actions at the Web site. Users can then use Maximizer to track their further interactions with that visitor.

Both programs provide extensive data exchange with Microsoft Outlook for users who want to keep Outlook as their primary e-mail and scheduling program. Those who use handheld devices with Windows CE or Palm OS will probably lean toward Maximizer's formidable syncing software, while users needing the most customizable interface and smoothest learning curve will like ACT!

All small businesses can benefit from contact managers, but the greatest strength of a contact manager, the ease with which it can accumulate and associate data, can also be one of its greatest drawbacks. Many novice users are inclined to gather every bit of information about a contact, from favorite color to golf handicap. Maintaining such trivia can bog down a contact manager's efficiency, creating sprawling records that get in the way of valuable sales data.

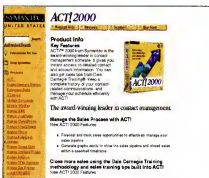
Contact managers are generally used in companies ranging from one to 25 employees. Beyond this point, additional features become necessary and require a higher breed of product.

Customer Relationship Managers

Just like contact managers overlap with and envelop the functions of PIMs, CRM applications build on the foundations of the previous two categories. There are four objectives of CRM software that embody this. First, CRMs work to enable people in organizations to better communicate about people with whom they're interacting. Second, they work to attract more customers through marketing. Third, people use CRMs to close more

customers through sales automation. Finally, CRMs help keep more customers through support automation.

In this last aim, we have one of the true segregators for CRMs. Most contact managers will assist users with various aspects of automating the sales process, but none will do the same for service. Only at the CRM level is it



Symantec's ACT! helped define the role of contact managers and continues to rewrite the book on what these programs can do.

realized that salespeople need feedback from the service department. Nothing is more embarrassing for a salesperson than attempting a repeat sale with a customer, only to find the product from the previous sale has been defective. Once a salesperson is armed with this information, he or she can approach the repeat sale differently and often much more successfully.

GoldMine, long a prominent name among contact managers, joined the CRM market in 1998 with the release of GoldMine 4.0 Enterprise Edition. Executive Vice President Jon Ferrara says the program's success is partially due to "its ability to track service issues and trouble tickets, which not only streamlines work throughout the service department but also provides sales the information they need to market more effectively, particularly to existing customers." (If a support trend emerges noting a high failure rate in a certain product, more success will be had on the sales side by avoiding this item.)

"Harvard did a study that shows it takes eight to 10 times as much money to sell a new customer as an existing

one," says Ferrara. "GoldMine enables a company to attract, and more importantly, maintain their most important asset: their customer base. Most companies lose half of their customers over five years. So just increasing your retention by 50% doubles your profitability."

The terms CRM and sales force automation (SFA) are often applied to the same product category, but SFA software tends to be custom tailored to the purchasing company and involve lengthy, costly installations. Still, a good CRM program will incorporate many SFA features, such as sales target tracking, quota tracking, call success ratios, and others. In an enterprise environment with numerous employees working on a single sales project, CRM software should be able to monitor and gauge the contribution of each member, as well as the entire group.

In constructing the Enterprise Edition, GoldMine took its 4.0 Standard Edition and added support for nearly every major back-end client/server database, including dBASE IV, Microsoft SQL, Sybase, and Oracle. This flexibility enables local and remote users to access information across a wide variety of platforms, with GoldMine able to adjust to new database formats on the fly.

Similar versatility is found with the inclusion of a strong Open Database Connectivity (ODBC) driver, such as in GoldMine Enterprise and Maximizer Enterprise. This driver allows the CRM software to swap information with other applications, such as Microsoft Excel and Access.

Naturally, the price for a CRM application's extra power is a longer learning time. Well-crafted examples such as GoldMine offer deceptively simple interfaces, but learning how to customize the power beneath those few buttons can be a long-term process. On the other hand, persistence, ingenuity, and some very good CRM documentation may be just what a fledgling company needs to move from breaking even to breaking records. ■

by William VanWinkle

Great digital pictures you can
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to use, MX-1200
digital camera.



Fujifilm's new, affordable MX-1200 digital camera produces great color pictures easily. And a full lineup of easy-to-use cameras makes it simple to print real pictures at home with the Fujifilm NX-70 photo printer or your current printer. Take them to your photo processor or upload them to Fujifilm.net so your friends and family can enjoy them anywhere. The digital age promised to make things easier. Finally, it has. For information call 1-800-800-FUJIF.

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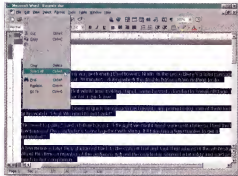


Microsoft Word 97

Common Shortcut Keystrokes

- Word Processing
- Beginner
- 97 for Win9x

The Word 97 graphical interface makes things simple by turning word processing into a point-and-click affair. Instead of requiring you to enter cryptic commands at a flashing prompt, Word provides program options through picture-based toolbars and drop-down menus.



You can select all the text in an open Word 97 document by pressing CTRL-A.

You can find out what toolbar buttons do by resting the pointer on a button; a yellow ToolTip will pop up and give you a brief description. If you forget which drop-down menu contains a particular program command, you can click a menu, release the button, and view the menu contents. Repeat these steps on each menu until you locate the command you need.

Using the mouse to click Toolbar buttons or select menu commands makes program operation easy, but it's also time consuming because removing your hands from the keyboard interrupts your typing flow. Luckily, Word's most popular commands and Toolbar buttons have keyboard equivalents. This means you don't always need the mouse to execute program functions.

Working The Keyboard

If your Word document is formatted for Arial type, but you want document text to be in Times New Roman, the mouse method would require you to stop typing, reach for the mouse, move the pointer to the Edit menu, click Edit, click Select All, then choose Times New

Roman from the font drop-down menu on the Formatting toolbar. With the keyboard method, you select all the text in the open document by pressing CTRL-A.

It's easy to figure out the keyboard equivalents for Word pull-down menu commands because each Word menu name has an underlined character (File, Edit, etc.). To display the contents of a particular drop-down menu, press and hold the ALT key as you press the underlined character on the keyboard. In other words, to view the contents of the File menu, press ALT-F; to view Format menu options, press ALT-O; to view items in the Window menu, press ALT-W.

Every option in a pull-down menu also has an underlined letter. For instance, press ALT-F to open the File menu, then press O to bring up the Open dialog box, or press A to display the Save As dialog box. You can also access buttons and other options within a dialog box by using the ALT key together with the command's designated letter. For example, if you press ALT-F, then O to bring up the Open dialog box, pressing ALT-O opens the highlighted document.

Check The Menus

In addition, keystroke equivalents for several commands are listed in the

drop-down menus. Press ALT-E to view the contents of the Edit menu and you'll quickly discover keyboard equivalents for Cut (CTRL-X), Copy (CTRL-C), Clear (DELETE), Find (CTRL-F), Replace (CTRL-H), and Go To (CTRL-G). The Tools menu reveals that if you press F7, Word performs a spell check and SHIFT-F7 brings up the Thesaurus.

Some Word shortcut keys don't display in pull-down menus. To apply bold formatting to selected text, you don't have to click the Bold button on the Formatting toolbar or open the Format menu, click Font, then select Bold in the Font Style menu. Instead, simply press CTRL-B. You can follow the same steps to format in italics (CTRL-I) or with underlined text (CTRL-U). ■

Additional Keyboard Shortcuts

Function	Press
To close a document	CTRL-W
To exit Word 97	ALT-F4
To display the Save As dialog box	F12
To increase the font size	CTRL-SHIFT->
To decrease the font size	CTRL-SHIFT-<
To change all selected letters to uppercase	CTRL-SHIFT-A
To apply double-space formatting	CTRL-2
To apply single-space formatting	CTRL-1
To add or remove a single line of text before a paragraph	CTRL-O
To apply/remove double underlining	CTRL-SHIFT-D
To center-justify a selected paragraph	CTRL-E
To left-justify a selected paragraph	CTRL-L
To right-justify a selected paragraph	CTRL-R

by Carol S. Holzberg, Ph.D.



WordPerfect 9.0

An Overview Of What's New

- Word Processing
- Beginner
- 9.0 for Win9x

WordPerfect 9 is a component of Corel's WordPerfect Office 2000 suite and is the

latest version of this popular word processing program. Several enhancements have been made to the program.

You'll notice the first change when you install Office 2000. Install-As-You-Go lets you install only those applications and features you need. If you select a noninstalled item at a later time, you will be automatically asked if you want to install it. This minimizes the used space on your hard drive.

Performance & Productivity

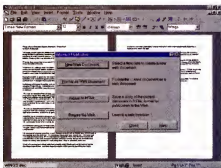
RealTime Preview. With RealTime Preview, you can preview formatting changes before applying them to your document. Scroll through and preview options, such as fonts, borders, tables, and shading, and see what selections will do to your document before you actually apply them. This timesaving feature helps you avoid undoing and redoing formatting changes.

Block make it fit. The Make It Fit option was made for anyone who has ever tried squeezing a two page letter onto one page. By shrinking point size, margins, or spacing, WordPerfect automatically makes text fit onto a specific number of pages.

The drawback to this feature is that you have to shrink the entire document. Fortunately, WordPerfect 9 addresses this shortcoming by letting you fit sections of your document into a specified dimension or number of pages without affecting other areas of the document.

Embedded fonts. Here's a scenario to consider. Suppose you create and send a document to a publisher, but are contacted because they are missing

some of the fonts you used in your document. The simple solution to this is embedded fonts. If you choose Font Embedding when you save your document, the fonts will be compressed and saved with the data file. You can use your favorite fonts without worrying about losing them when the file is opened on another system.



Options that help you publish documents to the Web are just some of the enhancements in WordPerfect 9.

Printing options. The new Print Preview feature lets you preview your document in single page or double page layout before printing it. Editing changes can be made while in preview mode, so you don't have to switch back and forth between views. The preview mode is compatible with RealTime Preview, so you can experiment with formatting options while previewing a document.

Collating options have been added to the print selections. This means when you specify the number of copies to print, you can have them collated, which avoids printing the first page of all copies, then the second page, and so on.

Other features. WordPerfect 9 includes several more performance and productivity enhancements. TextArt

options have been expanded, and over 100 new shapes have been added, such as arrows, stars and flowcharting tools. The top row or the left or right column in a table can be skewed to specific degrees; text in those cells can be skewed as well. The addition of Browse Buttons in a document makes it easier to navigate, and writing tools for more than 15 languages are included.

File Compatibility

WordPerfect 9 uses the same file format as WordPerfect 6.1 and Corel WordPerfect 7 and 8. This backward compatibility means that you can open and use documents that were created with earlier versions of the program.

File compatibility with other vendors' programs has been enhanced, so you can open and save Lotus Ami Pro and Microsoft Word files in their native file formats. You can also convert files to and from WordPerfect without importing or exporting the document.

Internet Features

The popularity of the Internet requires continual improvements in creating and viewing Hypertext Markup Language (HTML) documents. WordPerfect 9 includes an Internet Publisher that assists you in creating HTML documents without your required comprehension of HTML or related technical details. You can add check boxes, radio buttons, and other special fields to your documents.

A Web site creation tool known as Trellix is included to help you design your own Web pages. Use it to publish WordPerfect documents in HTML and organize content in a Web page format. Pages can be created, converted, and updated for use on the Web or in a corporate intranet without advanced knowledge of HTML or graphic design. ■

by Diane Kaye Walkowiak, M.A.



Lotus 1-2-3 Millennium Edition

Using View Menu Options

- Spreadsheets
- Beginner
- 9.0 for Win9x

Were you aware that you can change the way data is viewed on-screen by using selections under the View menu? To access those options, click View. The drop-down menu is split into four sections that control zooming (magnification) level, icon displays, window display, and viewing preferences. The available choices can help you customize the display of data on your screen. Keep in mind that all these choices aren't available in the Preview mode.

Zoom To A Different View

Zooming in or out of a worksheet lets you control how much data is displayed on the screen. You may want to zoom in to make data easier to read, or zoom out to get "the big picture."

To zoom to a preset level, click Zoom To, then select a percentage. To set a custom zoom level, such as 80%, click Set View Preferences and enter a percentage under Custom Zoom, then click OK. To zoom to that level, click Zoom To Custom Level.

Hide Or Show Options

Toolbar icons are a convenient alternative to using menus. However, the displays take up space on your screen. Hide SmartIcons and Internet SmartIcons by selecting Hide SmartIcons or Hide Internet SmartIcons from the View menu. Redisplay them by choosing Show SmartIcons or Show Internet SmartIcons.

The Status Bar at the bottom of the screen contains status and mode indicators and let you perform many functions by clicking buttons on the bar. For example, you can control the font, point size, color, style, and format of text or the pattern used in a graphic. The buttons available will vary depending upon what is selected in your worksheet.

The Edit Line is used to edit the contents of a cell. It also contains buttons that allow you to go to and select a named range, insert functions into cells, and cancel or confirm an entry. Display or hide the Edit Line by selecting Show(Hide) Edit Line.

Opening The Windows

To freeze areas of the worksheet for easier viewing, place the cursor where you want to freeze columns or rows. Then select View, Titles.

Select whether you want to freeze Rows Above Current Cell or Columns Left Of Current Cell (or both), then click OK. As you scroll through your worksheet, the frozen areas of the worksheet will remain stationary. To return to a normal display, select View, Titles, and deselect the option(s) you chose previously.

Viewing more than one area of a worksheet is often convenient, particu-

larly if you want to compare sections or see how changes in one area affect another. To split the window into two or four panes, place your cursor where you want the worksheet split. Then click View, Split and choose Top-Bottom, Left-Right, or Four-Way. Click OK to return to your worksheet, which will be split as you designated. To control whether the panes scroll together or independently, choose View, Synchronize Split or Unsynchronize Split. To return to a normal one-pane window, choose View, Clear Split.

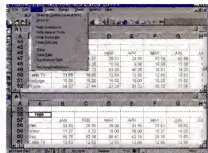
Setting View Preferences

Click View, Set View Preferences to access the View tab in the Workbook

Properties dialog box. Any new worksheets added to the workbook will use the settings you select. If you want the settings to be the default for new workbooks, select Make Default For New Workbooks.

Choose whether

to display the worksheet frame, graphics, formula and cell comment markers, version names and borders, datalink table borders, grid lines, sheet tabs, scroll bars, and manual and automatic page breaks. You can also select the color used for grid lines and the percentage used for the Custom Zoom level. Select Display Menu Command For Designing ActiveX And Java Controls to add a menu option under the View menu. This option, Design(Run) Controls, lets you switch between design and run modes for ActiveX and Java controls. ■



Options under the View menu let you take control of how data is displayed on-screen.

by Diane Kaye Walkowiak, M.A.



Going Online

Watch & Listen With RealPlayer G2

• Online
• Beginner

The dial-up modem bottleneck keeps today's Internet from reaching its multimedia potential, but users willing to wait for downloads or pay extra for fast connections can get a taste of the audiovisual future.

One of the most widely used tools for playing online video and audio content is RealNetworks' RealPlayer G2. RealPlayer is able to read just about any popular multimedia format and is a simple yet entertaining program that opens new doors for people accustomed to a more subdued Web.

You can download the current version of RealPlayer at <http://www.real.com>. Look for the link to the free RealPlayer G2. You'll get more features with the RealPlayer G2 Plus, but that version isn't free. Before downloading, you will need to fill out a short form with your name, e-mail address, and some information about your computer configuration. The site also asks you if you want to download other software along with the RealPlayer, such as America Online's Instant Messenger. Installing the software is relatively simple. Click the downloaded file and follow the directions to move through a couple of quick steps.

Using RealPlayer's basic features is as easy as operating a CD player. The buttons perform as advertised: At the top, you'll find Play, Pause, and Stop, as well as a slide control for volume. For any of these functions to have meaning, however, we must first find a sound or video file that RealPlayer can bring to life.

Seeking Sounds

RealPlayer offers a handful of ways to locate content. The most obvious is

the Channels list to the left of the RealPlayer window. A handful of channels come preset with the software. Just click an icon that looks interesting and it should begin to load. To scroll through the Channels list, click the thin arrow buttons at the top and bottom. Also, be on the lookout for a button to add new channels; choosing this selection pulls up a Web page where you can add or remove buttons from the Channel listing.

Other places you can use to find online entertainment are the Sites menu and Presets menu. Under the Presets menu, you will see a hoard of sites separated into categories. Similar to the Favorites or Bookmarks menu in Web browsers, you can add sites to the Presets menu by selecting Add To Presets while you have a site loaded. Finally, the RealGuide, which is accessible under the Sites menu and as a button near the bottom of the RealPlayer screen, calls up a Web page with just about every site that offers audio and video samples.

Customizing

The various RealPlayer options can take up a lot of screen space, so cut down the clutter with the View menu. Compact mode shuts off the Channels window, the search area, and some of the commands. Auto-Size mode causes the title bar and menu bar to disappear, except when the mouse cursor is moved over the RealPlayer window.

RealPlayer also attempts to gain multiple footholds in your computer's consciousness. Besides the link on the Desktop, RealPlayer also creates a shortcut in the Quick Launch Toolbar (if you use one) and shows up as an icon in the Taskbar System Tray near the clock. You can remove the shortcuts by right-clicking them and choosing Delete from the pop-up context menu. If you don't like the System Tray icon, right-click it and select Disable. RealPlayer will take slightly longer to start without the System Tray icon, but it will also use fewer system resources when you aren't listening to RealPlayer content.

If you have trouble with RealPlayer, turn to Preferences under the Options menu. Assuming your volume is turned up and you're connected to the Internet, the problem may be with your sound card, your video card, or the way you access the Internet. The Performance tab has tips for sound and video card problems. For connection difficulties, first make sure you've set the software for the



RealPlayer G2 lets you access recorded or real-time audio and video over the Internet. Depending upon your connection speed, the results are either impressive or unintelligible.

correct access speeded under the Connection tab. If you're connecting to the Internet through a network that uses a proxy, that information will need to be entered into the Proxy tab. RealPlayer may be able to self-diagnose other problems if you click Auto-Configure on the Transport tab.

Many users find that video seldom works very well, but audio often sounds decent, even at modem speeds. With the breadth of content available, downloading and experimenting with RealPlayer can be an interesting look at the truly multimedia Internet of tomorrow. ■

by Alan Phelps

Microsoft Excel 97

Using Range Names

• Spreadsheets
• Intermediate
• 97 for Win9x

For many people, the classic range references, such as A1:E25 in Excel, are too cryptic and unwieldy for effective use.

To make range references easier to use, you can replace Excel's default settings with plain-English names called range names.

For example, it's much easier to remember you want to send the Print range to the printer rather than to recall that the print range is C308:FF425. In fact, range names have a wide variety of uses, including in formulas, for worksheet navigation, and even in macros. To get you up to speed on this valuable feature, we'll show you how to set up, manage, and use range names.

Naming Cells

Here's the quickest and slickest way to name a range. First, highlight the cells you want to include in the range, then click in the Name Box at the left end of the Formula bar. Type a name for your range and press ENTER. Excel allows up to 255 characters for a range name, but you must use underscores instead of spaces in the name.

For even more flexibility in creating and managing range names, you can open the Insert menu and select Name, Define to display the Define Name dialog box. In the Names In Workbook field, type the name for your range. Enter the reference cells in the Refers To field and click the Add button. Instead of typing in the reference, you can click the Collapse button (at the right end of the Refers To box) and select the cells on your worksheet. Click the Expand button in the Define Name - Refers To: dialog box to redisplay the Define Name dialog box. Then click Add. After you

assign all the range names you want, click OK.

You can also use existing column and row labels as range names. For example, if you have a worksheet with months of the year in the top row and budget categories in the left column, you can quickly create appropriate range names by using the existing labels. To do this, select the cells for which you want to create range names, including the cell with the name of your new range. After you select the appropriate range, click the Insert menu, Name, and then Create to display the Create Names dialog box. Check the boxes that represent which labels you want to use, such as Top Row or Left Column, before clicking OK.

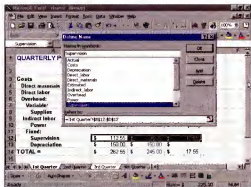
Managing Ranges

After you discover how helpful range names are, you may find yourself creating too many in a worksheet to easily memorize or track. There are, however, a couple of tools in Excel that will help you manage the names. To view a list of existing range names for a worksheet, open the Insert menu, select Name, and click Define to display the Define Name dialog box. Click a name on the list to view the associated range in the Refers To box.

You can also quickly create a reference list of the range names in a worksheet. Click a blank cell in your worksheet where you want to place the list, then click the Insert menu, select Name, and click Paste. In the Paste Name dialog box, click the Paste List button. Just make sure you use a blank area of your worksheet so

you don't accidentally paste the list over existing data.

If you want to change the cells used for a range name, open the Insert menu and click Name, Define. Then, click the range name you want to modify and enter a different range in the Refers To field. You can also use the Define Name dialog box to delete a range name. Just select a name on the list and click Delete.



Use range names to manage your worksheet more effectively in Microsoft Excel 97.

Using Your New Tool

Now you're ready to use the names you created. To quickly go to a named range, click the Name Box drop-down list arrow, then choose the name from the list. You can also open the Edit menu and select the Go To command to display the Go To dialog box. From there, double-click a range name on the list.

Finally, you can use a range name in a formula by substituting it for the associated cell references. For example, instead of summing up the column with values for January by entering `=SUM(B2:B25)`, you can create a range name for the cells, such as Jan, and then use the name in formulas `=SUM(Jan)`.

Give your worksheet ranges a facelift by assigning brand-new names, and you can forget those cryptic, built-in cell references for good. ■

by Linda Bird

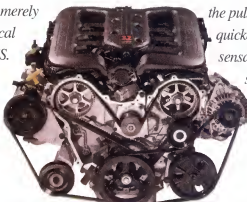
An automatic transmission that lets you decide when to shift? Gee. An available aluminum, 225 horsepower, 3.2 liter V-6, designed and proven in cyberspace? Gee. A sleek cab-forward sedan that feels roomier than some city apartments? Gee. These are merely a few examples of the technological artistry behind Dodge Intrepid ES.

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Web Browsers

Browsing Offline With Internet Explorer 5

• Online
• Intermediate
• Internet Explorer 5.0

The Internet is almost everywhere, but not quite. Just ask any notebook user who

says goodbye to that phone or network connection in the morning and tries to survive without the Web all day.

Microsoft's Internet Explorer 5 can ease the pain and jitters by downloading copies of the Web pages you like so you can view them later. Browsing offline works exactly like browsing online; you click links to move between pages, unless you're trying to access a page that isn't stored on your system.

Browse The Past

IE5 allows some kinds of offline browsing by default. Pages you visit while online are stored in the browser's History file for potential viewing in offline mode. To look back on Web sites without the Internet, first open the File menu and choose Work Offline. Next, click the History button on the main toolbar. (It looks like a sundial.) A History window appears on the left side of the screen.

By default, History pages are arranged according to the day you last viewed them. Click the day you think you visited the page, then click the site and finally the page. Sites that appear grayed out are not available offline. The Search button at the top of the History window will help you find pages, and the View button will list them in different ways. Note that in Work Offline mode you can also look at sites in your Favorites list that have been viewed recently enough to be saved in History.

Keeping Current

Although History is a good way to recall sites that don't change often, the best pages usually update every day or multiple times a day. As long as you have access to the Web at some point



Internet Explorer 5's Synchronize feature lets you download Web sites in advance and read them later, even when you're not connected to the Internet.

during your schedule, you can save pages in advance with IE5's Synchronize command.

To set up a page for synchronization, browse to the page and choose Add Favorite from the Favorites menu. In the box that appears, click the check box next to Make Available Offline. Then click Customize to decide how IE5 will save the page.

After an introductory screen, the Customize wizard presents the first important offline browsing decision. Do you want to download only the page you selected, or that page along with all its associated links? For example, if you want to read a news site that lists hyperlinked headlines, downloading one link deep will save the headline page along with the stories themselves. Pages can quickly multiply past one link deep, so increase this value with caution if you're running low on disk space or have a slow Internet connection.

The next section asks how often you want IE5 to download all of those pages. By default, the browser synchronizes offline content only upon your command. However, you can also put the process on autopilot. The Daily schedule that already exists will synchronize once a day. To make your own schedule, choose the New Schedule option.

Finally, the wizard wants to know whether the site you have selected requires a password to log on. Most Web sites don't, but you may have to experiment. Click Finish to complete the process. IE5 returns you to the Add Favorite dialog box, where you can click OK to send the browser on its way.

In Sync

When you finish adding a site to your synchronize list, IE will download it immediately for the first time. If you specified a number of links deep for the browser to delve, those pages will be downloaded, as well. You can always quit a synchronization if you don't want to stay connected by clicking the Stop button.

To download all of the sites you've set up for offline reading, select the Synchronize command under the Tools menu. A box appears with a list of the sites to be loaded. Click the Synchronize button to begin. You can click the Skip button if you don't want to waste time downloading certain sites. Depending upon your connection speed, the number of sites you selected, and how deep you've set the browser to download, synchronizing can be a speedy or slow process.

After you've disconnected from the Internet, choose Work Offline again from the File menu and navigate to the synchronized sites by finding them in your Favorites list. It's not exactly like being online, but it's close enough when your next Internet fix is hours away. ■

by Alan Phelps

Quicken Deluxe 99

Online Banking

- Personal Finance
- Advanced
- 99 for Win9x

Online banking is available in several formats, ranging from online bill payment to fund transfers between accounts. Quicken Deluxe 99 can handle those aspects of online banking, as well as a few more. We'll show you how to use Quicken for online banking.

The Basics

You can't simply open Quicken and begin banking online. You need to follow a few other steps first.

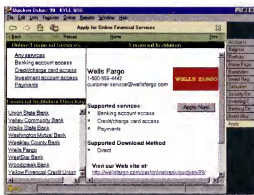
1. **Learn Quicken.** Before you bank online through Quicken, you need to master some basics. Make sure you've entered a few transactions for each account for which you want to use online banking and make sure your account balances match those of your bank.
2. **Set up your connection.** You need to set up your Internet connection to work inside Quicken before you can bank online. To do this, click the Online menu, Internet Connection, and then Setup.
3. **Find a bank.** Banks that are members of the Quicken Financial Network allow you to bank on the Web through Quicken. Check the list by clicking the Online menu and then Financial Institutions. Each bank usually charges a small monthly fee of about \$5 to \$10 for online services.

Sign Up

Once you're ready to use online banking, click the Online menu and then Online Financial Services Setup. In the window that opens, click Apply Now. If you correctly set up Quicken, it should automatically open a secure

browser inside the Quicken window and dial your Internet connection. (If it doesn't work properly, click Set Up in the Get Started window.)

Click the name of your bank in the list in the lower-left corner. In the right half of the browser, Quicken will show information about the bank, including



Click Online And Financial Institutions to see a list of banks through which you can access accounts using Quicken.

the available services. Click Apply Now to continue the sign-up process.

Follow the instructions on the screen to complete the process. Some banks will allow you to apply online; others require a telephone call. Some will request a signed form before they will complete the sign-up process.

Online Banking

Eventually (usually in about two weeks), you'll receive a welcome letter from your bank notifying you that you can access your account through Quicken. We'll walk you through the setup process and a few features.

Online setup. First, select Account from the Lists menu. Then, click the account you want to use and click Edit. Place a check in the Enable Online

Account Access and Enable Online Payment boxes and click Next. Then follow the directions on each screen. You'll need information from your welcome letter to complete the process. Repeat this process for each account.

Bill payment. When you pay a bill online, you're actually giving your bank instructions to send a certain amount of money from your account to a merchant. You can mark transactions for online payment in a couple of ways.

1. Click the Features menu, Banking, and Use Register. Then, enter Send in the Num column when entering a bill payment.
2. Click the Features menu, Bills, and Write Checks. Next, place a check in the Online Payment box.

Once you enter the remainder of the information for a particular payment and click Record Check or Enter, Quicken will determine whether you've previously sent a payment to the merchant. If it's a new merchant, you'll have to enter contact information and your account number for the merchant.

When you are ready to send all your transactions, click Online Center from the Online menu. In the Online Financial Services Center window, click Update/Send. Quicken will open your Internet connection and send the payments. You'll need to enter an identification number at some point.

Call your bank to determine the amount of lag time it will need to process your payments, thereby making sure your bills aren't submitted late.

Account access. Your bank will send you all cleared transactions when you click Update/Send to submit bill payments, thereby saving you from typing some transactions into Quicken. Using online account access, you can also submit requests to transfer money. Enter the information for the transfer in the register window, using the Online Transfer entry in the Num column. ■

by Kyle Schurman



PowerPoint 97

Using The Picture Toolbar

- **Presentations**
- **Advanced**
- **97 for Win9x**

If you've been working with PowerPoint 97 for a while, it's likely you've inserted clip art into a presentation. If so, you've probably also had occasions when the clip art just didn't look right. This is why PowerPoint 97 provides users with the Picture toolbar. It lets you adjust the colors, shading, and other options for clip-art images.

Display The Toolbar

By default, the Picture toolbar displays whenever you select a piece of clip art on a slide. You may, however, have accidentally turned off the toolbar's automatic display. To reset the automatic display, select a piece of art and open the View menu. Next, select Toolbars, then Picture from the drop-down menu.

Now you're ready to use the buttons. Like other toolbars, you can quickly find the name of a button by resting your mouse pointer over the button until a ScreenTip displays with the name of that button. You can also select the What's This? command from the Help menu and then click the button you want to research.

Change The Look

You can use the toolbar buttons to modify your clip art in a variety of ways. The Image Control button, which looks like part of a bar graph, allows you to convert a color picture to black and white or even into a watermark. To do this, select a piece of clip art and click Image Control. By default, the Automatic option is selected, which simply means PowerPoint uses preset colors. Choose the Grayscale option to

convert the color picture into shades of gray. (This is like changing the color picture on a television to a black and white picture.) In contrast, the Black & White command changes the image into line art. Finally, you can create a watermark, which is a faint image displayed behind text.

You can also make the colors in the object appear more intense by using more pure colors and less gray. To do this, repeatedly click the More Contrast button, which has a picture of a half black and half white circle, until you get the look you want. If the colors are too rich, click the Less Contrast button, which has a circle that is half dark-gray and half light-gray, to add more gray and tone down the colors.

You can also add white to the object to make it brighter. To do this, click the More Brightness button several times. This looks like a sun with an up arrow. To tone down the image, click the Less Brightness button, which looks like a sun with a down arrow. This will add the color black to the image.

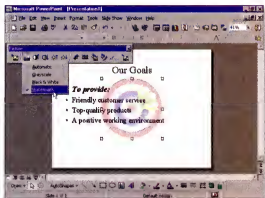
If you want, you can totally customize the colors in an image. First, click the Recolor Picture button, which looks like a paint can with a picture, to display the Recolor Picture dialog box. The Original column shows the colors that are in place. To change a color, click the appropriate drop-down list arrow in the New column, then choose a color. Preview your changes in the sample area of the Recolor Picture dialog box; click OK to finish.

You can also quickly add a border around your image by clicking the Line Style button, which has three lines of different sizes on it, to display a palette of lines. Just click the one you want.

To delve into a variety of other formatting options, including adding colors and lines, click the Format Picture button, which is the only other button besides the Recolor button with a paint can on it. In the dialog box that displays, click a tab, then change options such as size and fill colors.

Cropping

If you've ever wanted to use just a part of a clip-art image, you'll be happy to discover the Crop feature. To use it, click the Crop button, which looks like cropping tools, then move the special cropping mouse pointer on top of a resizing handle. Drag the handle in the



Use the Picture toolbar to create watermarks and other special effects with clip-art images in your presentations.

direction you want to crop the image. When you see only the portion of the image you want to use, release the mouse button. When you finish, don't forget to turn off the Crop button by clicking it a second time.

Bring It Back

Finally, if you've made a total mess of the image, you can redisplay the original art in a flash. Just click Reset Picture, which is the last button on the toolbar, to remove all the cropping and formatting you've applied. ■

by Linda Bird



Print Shop Deluxe

Working With Graphics In PressWriter

- Desktop Publishing
- Advanced
- 6.0 for Win9x

Broderbund's versatile PressWriter, an application bundled with Print Shop Deluxe, features a variety of professional-quality project templates for anxiety-free desktop publishing. By combining the user-friendly tools with a library of more than 100,000 graphics, PressWriter makes it easy to create appealing projects.

Working With Images

Every PressWriter project handles graphics similarly. For example, to create a PressWriter flier with a colorful illustration, open PressWriter, then click Flyers. Next click Customize A QuickStart Layout, then load your Print Shop's Install CD.

The Customize A QuickStart Layout window appears, enabling you to personalize a Flyer template. Select your paper size and orientation from the Paper drop-down menus. Make sure your Flyer template opens with graphic and text placeholders by placing check marks in the Sample Text and Sample Graphics boxes. Next, scroll the list of templates, then double-click one to select it.

Next, right-click the graphic placeholder. A context menu displays with several design options. If you like the sample image, click Color Behind Object to bring up PressWriter's Color Palette, then click a color to add a color background to the selected image; click OK to see the changes you apply. To readjust the background color, right-click the image again, choose Color Behind Object, then choose another color, or modify the original selection by working with PressWriter's Blend Style options.

Get It Noticed

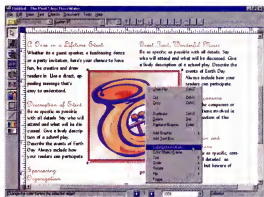
To make an image stand out, frame it with a distinctive border. Right-click the image, select Frame from the context menu, and click a design option in the Frame dialog. Add a drop shadow to the frame by clicking the box next to Include Drop Shadow. To see your choices, click OK. To get a better sense of how a frame will look when printed, click the View menu and select 100%.

To add color to an existing Object Frame, right-click the image and choose Color Object Frame from the pop-up menu. Once again, you'll see the Color Palette. Drag the pointer over the palette to view color options. As the pointer rests on a color, an expanded view of that color pops up. Click one to change the look of your object frame.

To modify other aspects of a project image, keep right-clicking. For example, point at Tint, then select a percentage. Changes you apply affect both the image in the foreground and the previously applied Color Behind Object. The lower the percentage, the lower the intensity of the color. To rotate the image, right-click it, point at Flip, then click Horizontal, Vertical, or Both.

To replace an existing graphic, right-click it, then choose Replace Graphic from the pop-up menu. Print Shop then prompts you to insert your Product CD. Insert the disc and search for an image by Category or Graphic Type (for example, square, row, column, or photo); you can also click the Search tab to look for graphics by keyword.

To import an image from a source other than a Print Shop CD-ROM, click the Import/ClickArt tab in the Select A Graphic window, then navigate to the folder or disk containing the image you want to insert. PressWriter supports several graphics formats, which makes it possible to bring in images from a variety of sources, including the Internet. To download images free of charge from PressWriter's Web site, go back to the Design Desk and click the Help menu. Select PS Online and click Select Your Internet Browser if you haven't



To customize a PressWriter project graphic, right-click the image, then make selections from the context menu.

already configured Print Shop to work with your Internet access account. If you've already configured Print Shop for Internet access, click Help, select PS Online, and click Print Shop Connection. Register for free access to 25,000 images by clicking the Register Now link at the top of the Print Everything Art Store page and follow the on-screen instructions.

After registering, you can search for new graphics by entering a category keyword and clicking Go. Next, simply click the graphic you want to download, and it automatically copies to a location you specify. Or, you can click-drag the graphic directly into your PressWriter document. ■

by Carol S. Holzberg, Ph.D.

Microsoft Works 4.5

Create & Use Charts

- Spreadsheets
- Advanced
- 4.5 for Win9x

Spreadsheets hold valuable information, but they're not terribly interesting. When you

want to give the facts a little flair ala *USA Today*, represent them visually with a chart. In a chart, numbers are represented as bars, lines, and the like, while headers and text show up as labels and titles.

In Microsoft Works 4.5, any spreadsheet document can hold up to eight charts such as pie charts, line charts, bar charts, and more; each as simple or complicated as you desire. When you change document data, the chart changes; when you save the document, the chart gets saved, too.

Your First Chart

To begin, you need only a spreadsheet with a few numbers. Open it and highlight the information you want to use: a couple columns of data plus headers, for example. Select Tools, Create New Chart. Under the Basic Options tab in the New Chart dialog box, pick from twelve options. Click any option to see a preview of your chart on the right side, looking for the one that best represents your data. Don't forget to enter a title and check the preferences for a border or gridlines, if applicable.

For charts based on multiple rows or columns, visit the Advanced Options tab. Basically, if a chart seems sideways or the data is the opposite of how you'd imagined, make adjustments here regarding the chart's organization. When the preview looks right, click OK.

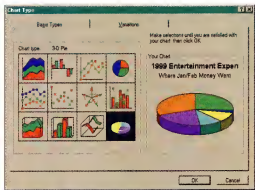
The chart now becomes part of the document. You can flip between it and the spreadsheet by picking either option

from the View menu or see them simultaneously by selecting Window, Tile. While the chart is the active window, you'll notice that options under the menus relate specifically to charts.

Fine-Tuning

To open the chart, first open the spreadsheet and select View, Chart. Select your chart from the list. To aid your memory, change the chart's name to something more original than "Chart 1." Select Tools, Rename Chart, and then type a name and click OK.

Although Works makes it easy to create a basic chart, it doesn't skimp on options for modifying an existing one. If you change your mind about your selection, choose Format, Chart



To graphically represent data from a spreadsheet, pick from 12 kinds of charts that Works helps you create.

Type. You'll get the same 12 options you had before, plus additional ones under Variations. Again, pay attention to the preview before you click OK.

If the main title isn't enough, add further titles by selecting Edit, Titles. Not only can you add a subtitle, you can also create titles for the X-axis (horizontal) and Y-axis (vertical). (This applies only to charts with axes,

such as line charts.) In a title entry field, you can enter either text or a cell reference so that spreadsheet data is automatically used.

The Series option under Edit lets you change the data used. When you visit this dialog box, you'll see references to the cells that were highlighted when you created the chart. Some charts, such as pie charts, have only one series by design. For charts, such as line graphs, though, up to six series can be used. To add another set of information, type cell references into an empty series box. Alternately, go into the spreadsheet, highlight the cells you want included, and select Edit, Copy. Back in the Series dialog box, place your cursor in the appropriate entry field and click the Paste button.

You can adjust the look of the chart through the Format menu. For instance, the Font and Style option lets you control the font, size, and style of the chart's text and the orientation of the Y-axis title, if applicable. Through Shading and Color, adjust patterns and colors. Before you close this dialog box, you must click the Format button for changes to take effect.

Using Your Charts

To print, simply select File, Print and proceed as normal. You can also insert a chart into a word processing document by selecting Insert, Chart and picking the spreadsheet document and chart from the lists that appear.

Once you start working with charts, you'll find that there's a lot more functionality to the program than we have room to cover here. For instance, you have control over legends and labels, which describe the chart's information. You can also make more advanced changes to the axes through the Format menu. Start out simple and get as elaborate as you want. You're charting your own territory now. ■

by Sarah D. Scalet

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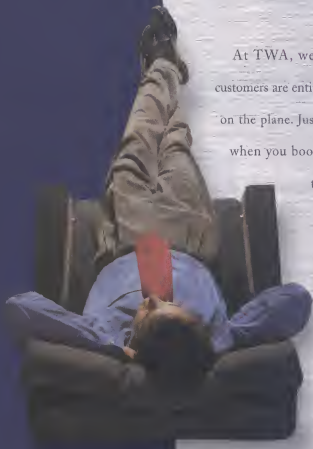
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Quick Tips

Secrets To Succeeding In Common Tasks



Microsoft PowerPoint

Sometimes truth is stranger than fiction. You can actually make your PowerPoint 95 or 97 presentations smaller and lighter by adding a slide. While it sounds bizarre, adding a blank slide to the beginning of your presentation will make your PowerPoint presentation smaller. The blank slide will serve as your preview image. Since a blank image obviously takes up less space than a more complex slide, the end result is a smaller PowerPoint file. If you're adding a blank slide to an existing presentation, make sure to save the presentation under a different filename.

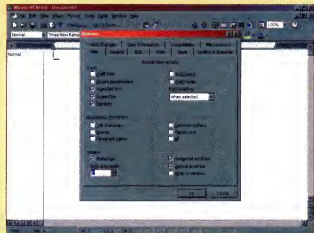


Inkjet Printers

Printing long documents on inkjet printers can sometimes be an exercise in how to collate. This is especially the case if you have multiple copies. The problem is that most inkjet printers print face up, which means that your document is in reverse order after it has been printed. If you're using Word 95 or 97, however, there is a simple way to correct this problem. In Word, click the Options button in the Print dialog box and check the Reverse Print Order checkbox. The result will be properly

collated documents without all the fuss.

✓ Many inkjet printers have a special cleaning cycle that removes ink from the printing heads when the power switch is



Changing the value in the Style Area Width dialog box allows you to view and easily manage style properties for individual paragraphs throughout your document.

turned off. But if you plug your inkjet printer into a surge protector and use the surge protector to turn the printer on and off, the printer can't complete the cleaning cycle. Instead, turn off your printer and give it a few seconds to complete the cleaning cycle before you turn off the surge protector.



Microsoft Excel

When you're working with Excel spreadsheets, you

want to see as much of your work as possible. Unfortunately, the toolbars can get in the way. Try choosing Full Screen from the View pull-down menu. This will leave only the pull-down menu at the top and provide more real estate for your spreadsheet. If you need to see more, switch to a smaller zoom percentage in View, Zoom. When you want your toolbars back, simply select Full Screen from the View menu again.



Microsoft Word

If you like using multiple styles for your paragraphs within Microsoft Word and are looking for a way to manage the styles more effectively, you need to be in Normal or Outline view and select Options from the Tools pull-down menu. Click the View tab and find the Style Area Width textbook. Select an appropriate width and click OK. Word will create a small margin on the left side to provide your style information.

✓ Are you without an Office Assistant, missing Web Authoring Tools, or minus a text converter? Not all available components are installed during a typical Word 2000 setup. At any time, you can go back to your installation CD-ROM, see what you're missing, and remove or add components from the previous installation. The re-install process shouldn't wipe out any modifications you made, but it never hurts to back up. Word 2000 also sports a Detect And Repair option in the Help menu that restores broken or deleted files.



Wallpaper & Background

Windows 9x allows you to use any bitmap (BMP), Joint Photographic Expert Group (JPEG), or Graphics Interchange Format (GIF) image file as your desktop wallpaper. Just click Start, Settings, and Control

Panel. Double-click the Display icon and select the Background tab. Select the Browse button, find the picture you want to use as your PC's wallpaper, and click Open. Upon returning to the Background window, click the arrow under the Display heading near the bottom of the page and select Center, Tile, or Stretch to specify how the image will appear on the Desktop. Click the Apply or OK button to set the image as your new background. (NOTE: If you're working with a small image, selecting the Stretch option may result in a distorted picture caused by the image being forced to fit across the entire screen.)

Disk Maintenance

Adding the ScanDisk utility to your StartUp menu will let your computer check for, and attempt to fix, errors or damage to your hard drive and diskettes. This will occur every time the computer is started or rebooted. Right-click the Start menu and select Open. Double-click on the Programs icon, then the StartUp folder icon. Click the File menu, point to New, and choose Shortcut. At the command line, type in scandisk.exe and click Next. Then, type in ScanDisk as a name for the file when prompted and click Finish. The utility will run after your computer is restarted.

Windows Imaging

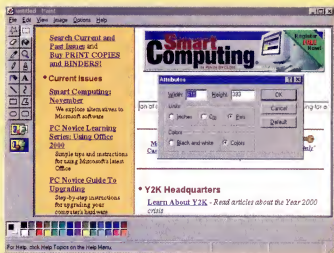
To match monitor and printer colors in the Windows Imaging program under Windows 98, click the File menu and select Color Management. Select Enable Color Management and Basic Color Management. Use the arrow keys below the Monitor Profile and Printer Profile options to specify a color profile to use and the arrow under Rendering Intent to select a rendering choice. Click the Apply or OK button to view the difference in your image. By selecting the Proofing option near the top of the screen, you can also make a choice under the Emulated Device Profile menu to view your image as it would appear from another monitor or printer.

Joysticks

Tired of joystick calibration routines? Go digital. Take a look at the digital joysticks entering the market. They use a different technology than analog joysticks and some digital models have eliminated the need for recalibration.

Microsoft Outlook 98

Saving copies of e-mail takes up hard drive space, especially if you're a voracious e-mail consumer. After awhile, it's a good idea to go into the Sent Items folder and delete what you don't need. Open the Sent Items folder, highlight the message you want to delete, and click the Delete button. To delete an entire group of messages, hold down the SHIFT key on your keyboard and then



Use the Attributes option under the Image menu in Microsoft Paint to modify and set image sizes for your various projects.

click the first and last message in the group. This action highlights everything in between. If you want to pick and choose between which messages to highlight, hold down the CTRL key when you select messages. In both cases, when you're ready to delete, click the Delete button, or simply press the DELETE key on your keyboard.

Microsoft Paint

The normal setting in Win95's Paint is your screen's current size, expressed in pels (short for pixels). Win98's default size is one-fourth your current screen size. If you're creating a picture for a Web site or for a computer with a different monitor resolution, however, you'll want to change it. Select Attributes from the Image menu to set the size and picture type you want to create. Remember that if you're using Paint to create images for the Web, you'll need to convert them with a separate program.

Modems

To take full advantage of 56Kbps connection speeds, your ISP must support your 56Kbps modem standard. If it doesn't, for example, if it only supports x2 technology and you have a K56flex modem, you'll be limited to World Wide Web surfing at 33.6Kbps.

Scanning

Flatter is better. A slide scanner with a filmstrip adapter will hold the strip of negatives in place to give it a great scan quality. A flatbed scanner is likely to have problems with negatives, because even negative holders won't hold the film flat enough. The best move? Get an 8 x 10-inch piece of high-quality glass with beveled or taped edges; keep it clean and scratch-free and put it over the negatives to flatten them. Be sure it's thin enough to allow the transparency adapter to be in proper position. ■

Programming From Ground Zero

Working With Computer Languages Is Both Demanding & Rewarding

PROGRAMMING IS A SKILL, and like most skills, it is not something you simply read about and then execute. Learning to program is like learning to speak a foreign language; it's a long process requiring much work. Even for the gifted and motivated, it takes years of effort to become a top-notch programmer. On the other hand, the rewards can be substantial. The demand for talented programmers seems inexhaustible, so becoming one leads to ample employment opportunities and healthy salaries. In addition, many find programming to be a creative, deeply satisfying endeavor. Consider constructing an elegant solution to an intricate problem, such as finishing the blueprint of a cathedral, and then bringing it to life in running code.

This article is about getting started in programming. It covers the fundamental concepts needed to become an effective programmer. Even for those who don't plan to make a career out of writing code, there are many times when a little understanding of the programming technique can go a long way. For instance, you can significantly benefit from learning how to automate tedious

tasks in a large spreadsheet of data. Or perhaps you want to learn how to add some interactivity to a dull Web site. A little bit of programming skill can get you there.

It is also worth taking a moment to consider the similarities and differences between programming and writing Hypertext Markup Language (HTML, the programming code used to create electronic documents, especially Web pages). Computer programs and HTML pages are both written in artificial languages with specified syntactic structure. Writing HTML requires attributing some text with markup codes that describe the desired formatting. Writing programs is more difficult; it requires detailing the steps that are needed to achieve some operation.

The bottom line is that if you have spent a great deal of time with HTML documents and still find all the markup codes, such as `<TABLE BORDER=1>` and ` Click here for CNN`, obscure and mystifying, there is a good chance that programming is *not* a pastime you're likely to enjoy. On the other hand, if you can somehow see the logic and order behind the codes in HTML documents, perhaps programming is a topic you want to learn more about.

Pick A Language

Should you begin with Ada, Assembly, BASIC, C, C++, Java, LISP, Pascal, Perl, Rexx, Scheme, Tcl, or Visual Basic? Hundreds of programming languages seek your time and attention. While there are many different motivations for learning to program, each program addresses a specific need. In general, the characteristics of the problem you need to solve, the experience of the programmer, and the targeted computer platform all guide the programming language choice.



Illustration: Bob Ayres

Programming languages vary widely among several dimensions. One common consideration is the level or generation of the language. Earlier generations correspond to lower levels, and these correspond more closely with the binary machine language of ones and zeros that computer processors understand. The higher-level languages are easier to read and write, but at the cost of some efficiency. Assembly languages, which are symbolic representations of the underlying processor instructions, are the lowest level of programming language. Today, very few programmers ever get down to this level.

Given the abundance of programming languages, it is fortunate that only a few choices merit consideration for programming novices. Among these are C, Java, Perl, and Visual Basic. A few languages such as Pascal, Scheme, and LISP are frequently used in introductory programming courses in academia; however, they are not included in this article because we're assuming that you are interested in a language that you're likely to use in the real world.

C is the oldest and only compiled language of the programming choices mentioned in the previous paragraph. (A compiled language is converted by a compiler into a standalone program consisting of instructions directly understood by the computer's processor. A program such as this does not require an interpreter to operate.) Learning to program in C is an ambitious but well-trodden path. The language's flexibility and lack of constraints have lead software veterans to characterize it as quite tricky for the novice programmer.

On the other hand, if you have dreams of hacking in the Linux operating system kernel, C is for you. Tool support for C is mature, which means you can readily find high-quality debuggers and compilers that help you work with the language. C++ is C's newer cousin that supports the object-oriented programming style. While it is quite popular in industry, the C++ language has added so many features that using it to learn programming is even more daunting than using C.

Java is a newer language than C++, and it also supports object-oriented programming. Java is considerably less cluttered; the language has only a third of the number of reserved words (words with special meaning) that C++ does. Part of learning a language involves learning the semantics of the reserved words.

Java is a hybrid of compiled and interpreted language and is converted into a form that executes inside a Java Virtual Machine (JVM). One of the appeals of Java is that its programs can be executed in any platform, including Windows, Mac OS, Unix, or in a Web browser program.

Perl is the dominant programming language of the World Wide Web. It is a relatively high-level language with many programmer-friendly features, despite having a somewhat twisted syntax. Perl's expressive authority lets people create powerful programs with only a few lines of code. A Perl program can be much shorter than the equivalent C or C++ program. And because Perl is interpreted, programs written with it are not as fast as those written in C. When programmer productivity is paramount or when the problem calls for manipulating text files, however, Perl is an excellent choice.

Visual Basic (VB) is a good language for quickly writing Windows applications. It is a very high-level language that, when combined with Microsoft's Visual Basic integrated development environment (IDE), permits programmers to quickly develop graphical and interactive applications. Visual Basic's stepchild, Visual Basic for Applications

(VBA), is the built-in macro language for Microsoft's Office application suite. Automating tedious tasks in an Excel spreadsheet, for example, is naturally accomplished with VBA. Visual Basic is only suited for developing programs for Windows, and it is the only choice among the languages listed in this section that requires the purchase of development tools.

If you are wistfully thinking that you want to learn more than one language, be patient; once you have mastered programming in one language, it is much easier to learn to program in another new language. Many experienced programmers pick up a new programming language in only a couple of days and become proficient in a few months.

The Starting Line

Problem solving is the essence of programming. In its most simple incarnation,

a program consists of a single algorithm (an unambiguous sequence of steps that follow results in search of a solution to a particular problem) to follow to compute a result. One algorithm you can use to solve the problem of calculating the arithmetic average of a series of numbers is shown in Figure 1. This simple sequence of steps makes an excellent springboard from which to dive into the depths of programming.

Working through this example introduces concepts such as variables and control structures that can be found in the majority of existing programming languages. There are, however, exotic programming languages that don't have this type of arrangement. At a high level, the algorithm shown in Figure 1

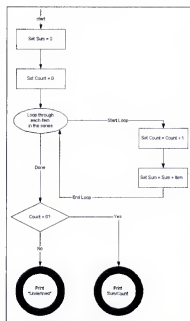


Figure 1. This abstract algorithm diagram represents the computer programmers' purpose of solving problems.

computes an average by adding all the numbers in the series and then dividing the result by the number of elements. Figure 2 represents this algorithm translated into the C programming language. By analyzing Figure 2, one starts to discover more of the details that make programming an acquired skill.

At the start of the algorithm, there is the "Sum," whose value is set to be 0. Even at this basic step, there is more here than meets the eye. A good way to start learning is to start asking questions, such as: "What is the thing named Sum?" The answer? Sum is a variable. A variable is something that holds a value. How you create variables and what types of values they can hold are determined by your choice of programming language. Higher-level languages have more program-friendly variables.

Essentially, the program illustrated in Figure 2 works in exactly the same way that you would calculate the average by hand. It goes through each number in the series and adds it to the value already stored in the variable Sum. While doing that, it keeps a count of the number of items that need to be averaged. When all the numbers are tallied, it divides the sum of the series by the number of elements and then prints the result.

For Future Reference

So far, we've provided only a brief glimpse of the programming world. There are many new ideas to master on the way to becoming an accomplished programmer. This section addresses some additional considerations about how you can learn more and answers a few more important questions.

Can you teach yourself to program? Absolutely! Many gifted programmers are self-taught. They frequently have two characteristics in common: a strong desire to solve a particular problem and the ability to break down problems into sub-problems. One caveat for the self-taught: A vast body of theoretical and practical knowledge is available through formal instruction, therefore, it's not

productive to spend time thrashing over a problem known to be intractable when you haven't even learned the fundamentals that would tell you such a problem is intractable. At some point, programmers should learn the fundamentals if only to avoid unwittingly trying to solve impossible problems.

How can you learn more? There are hundreds of books about programming at bookstores and libraries. There are also resources available on the Web, as well as in local college and continuing education classes. One excellent resource for introductory information can be found at Free-Ed Ltd. ([http://](http://www.free-ed.net)

```
#include <stdio.h>
#define SIZE (5)
int
main()
{
    int sum = 0;
    int count = 0;
    int series[SIZE] = {22, 2, 9, 42, 84};
    int index = 0;
    for (index = 0; index < SIZE; index++)
    {
        sum = sum + series[index];
        count++;
    }
    if (count > 0)
    {
        printf("Average: %f\n", (float) sum / count);
    }
    else
    {
        printf("Average: [Undefined]\n");
    }
    return 0;
}
```

Figure 2. The code shown here demonstrates how a simple program in the C programming language can calculate the average of five numbers.

www.free-ed.net). This site includes detailed information about programming in C, C++, Java, Perl, and Visual Basic.

Another online resource is the Web site complement for the book "Teach Yourself Java in 21 Days" (<http://www.pbs.mcp.com/ebooks/1575211831/index.htm>). Although this information is very helpful, programming is still a skill that you can only master through a considerable amount of practice and effort. You wouldn't expect to become a concert pianist or a talented artist after only a dozen hours of practice and the studying of materials at a music- or art-oriented Web site. Therefore, it isn't reasonable to believe that only reading

through educational material will turn you into a great software developer.

Formal education is the best avenue for learning to program. Fortunately, numerous colleges and continuing education sources are continually offering introductory courses in computer programming. Taking a programming class can help speed you along the path to wisdom because you won't have to spend as much time scratching your head over a problem when you can ask someone who knows the answer.

Believe it or not, computer programming is not the most difficult part of developing software. For an experienced programmer, the vast majority of programming involves translating a design into a familiar language for execution. Once you have programming under your belt, you'll find that good design is much harder to master than good programming. Understanding design involves a deep understanding of the problem you're solving. Moreover, a good software design has to have a sufficient amount of flexibility to incorporate unforeseen changes. This requires considerable deliberation and forethought in order to anticipate and accommodate possible future demands upon the software.

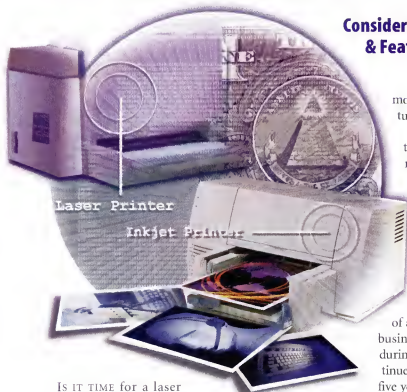
A nearly iron-clad rule in software engineering is that any successful software system will continue to evolve over its lifetime. The test of a good software design is whether or not it needs to be changed as the system evolves. So, as it turns out, design is a complex process requiring experience and superior judgment.

Not only that, but there is even more to programming than just coding and software design. Other important considerations include testing, documentation, learning new code libraries, and writing code that can be easily maintained and enhanced. Once you take the first few steps toward learning to program, the opportunities for growth and improvement can last a lifetime. ■

by C. Reid Turner

Is It Time For A Laser Printer In Your Life?

**Consider Price, Performance
& Features When Making Your Decision**



IS IT TIME for a laser printer in your home or small office? It probably wasn't a few years ago, but with laser prices falling by 4.14% per year according to Dataquest, it may be time to reconsider your decision.

It won't be an easy choice, though, because inkjet prices are plunging faster than laser printer prices. According to Dataquest (<http://www.dataquest.com>), the average end-user purchase price for inkjets will fall by 9.93% each year through 2003. That's more than twice the rate at which the price of one page per minute (ppm) to 10ppm monochrome laser printers will fall. For perspective, only 36% of laser printers sold in the United States in 1998 went into a home or small business (one with fewer than 100 employees) as opposed to 77% of inkjets, according to International Data Corp. (<http://www.idc.com>).

If the price issue doesn't make your decision any easier, the quality question won't help. Falling printer prices don't equate to flagging quality. Dataquest Senior Industry Analyst Paula Bursley says inkjets have been improving in speed and print quality over time, and they offer color printing for less than the price of a

monochrome laser. However, laser printer manufacturers have responded by improving their products.

"These trends are forcing the laser market upward to higher speed segments," Bursley says. "You can now buy a printer in the 11 to 15ppm range for about the same amount of money you would have spent on a 4 to 6ppm printer a few years ago." Lasers win the speed trials, but some inkjets have comparable quality, plus color.

Because of this competition, Weili Su, an IDC analyst, predicts that lasers and inkjets will experience similar market growth in the next five years. Su predicts that home users will buy a slightly larger share of inkjet printers (from 62% of all inkjets sold in 1998 to 63% in 2003), while small businesses will increase their shares from 15% to 19% during the same period. Similarly, home users will continue to buy about 11% of all laser printers for the next five years, according to Su, but small businesses will buy slightly more lasers in general (from 25% in 1998 to 28% in 2003) and substantially more desktop color lasers (from 15% in 1998 to 25% in 2003). Small businesses will constitute the key growth market for both types of printers, but home users will continue to buy about the same proportion of each.

Pros & Cons

If you've always believed that laser printers were beyond your means, you probably never gave them much thought. This list of each printer's benefits and drawbacks should help you make a better purchasing decision.

Laser pros. The primary benefit of a laser is the quality of its monochrome output. Even inexpensive models can kick out crisp text in their highest quality mode.

In addition, lasers are known for speedy operation, which is why they are common in networked businesses in which many people share the same printer.

Laser prints won't bleed or run when wet as inkjet pages might, since a laser printer creates images by fusing

plastic powder to the page rather than squirting ink and letting it dry.

It's even less expensive to print on a laser than on an inkjet. On average, inkjet copies might cost five cents per page, while a low-end laser prints that same page for two or three cents. This small difference adds up over time.

One other benefit is that lasers are usually upgradeable with network options, document handling attachments, hard drives, and more random-access memory.

Laser cons. Initial costs are higher for laser printers, and the sticker shock caused by an \$80 to \$200 replacement toner cartridge can scare away potential buyers. Laser owners spend less than inkjet owners over time, but a laser's price is a big pill to swallow early on.

Most home users and many businesses need color printing capability. Realistically, it's hard to find a decent color laser for less than \$3,000. "Color . . . laser printers are being sold into business exclusively, as they are too expensive to purchase and operate to be considered for home use," Bursley says.

Color lasers are also fairly complex machines. Instead of one to four cartridges like an inkjet, color lasers require four colors of toner, a bottle of fuser oil, and up to four developer refills. And all lasers, not just color models, require a few major parts (the optical photoconductor drum and fuser roller) to be replaced from time to time.

The same fusing process that makes laser printouts so durable also makes it difficult to duplex, or print on both sides of a page. The cooled toner on the first side may re-melt if the page is fed back through the printer. A low-end laser may not let you duplex at all.

Laser printers are finicky about the papers they use. You can generally use regular 16-pound to 20-pound paper in a laser printer as long as it doesn't violate the printer manufacturer's guidelines. Envelopes and other thick materials require special feeding techniques, if they are even usable in inexpensive models.

Inkjet pros. One benefit of an inkjet printer is price. Like many other peripherals, yesterday's top-of-the-line model is today's bargain. One example is Epson's Stylus Color 640 (<http://www.epson.com>). This printer dropped in price from \$199 a year ago to \$179 in January and \$159 in August, and if you claim the \$30 rebate before the end of this year, you'll pay only \$129.

The Epson Stylus 640's color prints illustrate another key point in favor of inkjets. While some inkjets are better than others in color performance, many can stand neck-and-neck with color laser printers more than 10 times their price. Monochrome and text quality haven't been ignored. Many inkjets boast of near-laser text quality when printing on good paper.

Inkjets also are easy to maintain. All the user needs to do is change an ink cartridge every 500 pages or so and perhaps clean the printer every few months. Some printers require new

print heads or nozzles once in a while, but with many brands, the user changes these as part of the ink cartridge.

Inkjet cons. Even though inkjets cost less than lasers, they cost more to operate over time (see above). New ink cartridges retail for about \$25 and may print 500 pages of average text, whereas a \$70 to \$80 low-end laser toner cartridge may print 3,000 pages or more. The inequity is apparent with moderate to heavy inkjet usage, but it doesn't take long to surpass the total cost of ownership of a low-end laser printer.

Inkjets are also slower than laser printers. Compare an inkjet's 2ppm to 8ppm to the 8ppm

to 12ppm of inexpensive lasers.

Inkjets also have lagged behind in network options and add-on accessories. This is gradually changing through pricier inkjets such as the Xerox DocuPrint C20 (\$699 MSRP, <http://www.xerox.com>). The C20's optional Ethernet 10Base-T card costs \$299. The DocuPrint NC20 (\$999 MSRP) is the same printer with an Ethernet card already installed. This price is within networkable monochrome laser territory, but don't forget that the C20 and NC20 also print color.

Win-Win Scenario

Whether you choose a laser printer or an inkjet, you can save money on the purchase price. Both experience regular price cuts as new models are introduced. And both are assuming the good points of the other and trying to minimize their own shortcomings. As long as you choose your printer wisely for your situation, you can't lose. ■

by Marty Sems

United States Printer Price Trends

	Average End-User Price, 1997	Average End-User Price, 1998	Average Price Change, 1997 to 1998	Projected Price Change Over Next Five Years
Monochrome Laser Printers, 1ppm to 10ppm	\$546	\$499	-8.61%	-4.14%
Color Laser Printers, 1ppm to 30ppm (mono)	\$4,649	\$3,698	-20.46%	-13.30%
Color Inkjet Printers	\$276	\$235	-14.86%	-9.93%

Desktop Systems

Solid Celeron System

If a well-rounded system with a Celeron processor is on your shopping list, look at the Compaq Presario 5714. This is one of the more solid Compaq systems we've examined, and its \$1,298 price tag is surprising considering the host of features on this machine.

The Compaq Presario 5714 sports an Intel 466 megahertz (MHz) Celeron processor with 128 kilobytes (KB) of Level 2 (L2) cache and a 66MHz bus speed. It comes with 64 megabytes (MB) of Synchronous Dynamic RAM (SDRAM), and the motherboard supports up to 256MB of SDRAM. If you save a lot of data or images, you'll like the 12.7-gigabyte (GB) Quantum Bigfoot hard drive, plus a 100MB internal Iomega Zip drive for conducting backups or storing large files and transferring them from one computer to another.

For your multimedia tasks, there is a 32X CD-ROM drive and a strong pair of JBL Pro speakers with volume control and a front headphone jack. Compaq also includes the Easy Access Internet Keyboard with the system. The keyboard features a Quick Print button for instantly printing a Web page or an open document and controls for the CD-ROM drive. There are also shortcut buttons such as Instant Internet, Search, E-mail, and Online Marketplace. If you need product information from Compaq, press the My Presario shortcut button.

For running your multimedia and three-dimensional (3-D) programs, there is an Intel 810 video card with 8MB of video memory, which produces excellent images. Another highlight is the Compaq MV720 17-inch monitor that ships with the system. The monitor produces great colors and features an integrated microphone and a 15.9-inch viewable image. Plus, the digital on-screen controls are simple to navigate. Whether you're looking at buying this system for the home

Presario 5714

\$1,298

Compaq Computer Corp.

(800) 888-5925

(281) 370-0670

<http://www.compaq.com>

or the office, Compaq has included both a 56Kbps/V.90 compatible modem and an Ethernet network adapter.

The Presario 5714 comes with numerous software titles, including Windows 98, Microsoft Press, Works, Money, Encarta Encyclopedia, Quicken 99, and Videogram Creator. You'll also find software for remote support and hooking up a home network, and Compaq Utilities helps you maintain the system for optimal performance.

The Presario 5714 is bundled in a midtower case that offers plenty of room to work on the inside. The entire outside cover lifts off the case to reveal a spacious interior with two Peripheral Component Interconnect (PCI) slots for expansion and one dual in-line memory module (DIMM) slot to add memory. For adding another hard drive or CD-rewritable (CD-RW) drive, there are two 5.25-inch bays free and an available 3.5-inch bay. In addition, there are four Universal Serial Bus (USB) ports, a front joystick port, and two FireWire ports.

We evaluated the Compaq Presario 5714 by running BAPCO's SYSmark 98 benchmarks, which runs 14 application-based benchmarks to determine performance, and MultimediaMark 99 by Futuremark Corp., which tests the multimedia capabilities of the system. We also ran a few additional tests with basic office software and 3-D programs. The system delivered an impressive performance in all the benchmarks, exceeding some of the scores of other systems using the Intel Celeron 466MHz processor.

The 5714 breezed through our 3-D testing, producing impressive video images. In the BAPCO tests, the highest score was in Content Creation with a 171, followed by a 149 in Office Productivity, for an overall score of 158. For the MultimediaMark 99 benchmarks, the system scored a 1,161 in Image Processing, a 1,111 in MPEG-1 Video Encoding, a 1,083 in Audio Effects, and a 918 in MPEG-1 Video Playback, for an overall MMARKS of 1,068.

With its solid benchmarks and array of features, the 5714 would make a great PC for the home or for a small-business environment. The price is affordable, and the expansion possibilities are flexible. ■

by Buffy Cranford-Petelle

This Month's Reviews

Desktop Systems	
Compaq Presario 5714	80
Networking	
ADS USB to Ethernet Networking Starter Kit	81
Video Cards	
Winnov Videum AV	81
Monitors	
Princeton Ultra 52B	82
Storage	
Imation SuperDisk IDE Drive	82
Printers	
Brother HL-1240	83
CD/DVD Drives	
Current Leaders	83

Networking

Computer Network In A Box

A quick look around your local computer and electronics superstore these days should convince you that Universal Serial Bus (USB) technology is extremely useful. You can find USB-compatible scanners, printers, modems, and even mice and keyboards that plug into your computer's USB port. USB, however, isn't just for attaching peripherals.

Several companies have recently released excellent USB-to-Ethernet solutions that allow you to connect your desktop or notebook PC to Ethernet local-area networks (LANs) without the hassle of installing a network interface card (NIC). ADS Technologies offers such a product and goes a step further with its new USB to Ethernet Networking Starter Kit, which allows you to create your own USB to Ethernet network.

The kit comes with two USB-to-Ethernet adapter plugs, which are Ethernet ports with 6-inch cords and USB plugs on the opposite ends. Plug one of these nifty adapters into an open USB port on your PC and install the software, and your PC is Ethernet-compatible. Plus, once you configure Windows' network protocols properly (the included manual gives instructions on this), you are ready to plug a line from your home or office 10Base-T Ethernet network into the other end and let the sharing begin.

The other main component of the kit is its five-port

Ethernet hub that comes with an AC adapter. Using this hub and the two included adapters, you can connect two computers. If you want to network more computers, you can purchase additional adapters and hubs.

The kit has an estimated retail price of \$169. Even though this may be more

than you'd spend to create an old-fashioned network, the kit offers Plug-and-Play USB installation and comes with some useful software, including Microsoft's Internet Explorer 5.0.

USB to Ethernet Networking Starter Kit

\$169

ADS Technologies Inc.

(800) 888-5244

(562) 926-1928

<http://www.adstech.com>

Video Cards

Action!

Most video-capture products haven't impressed us. They are either too expensive, too difficult to use, or the video captures simply aren't good. The Winnov Videum AV, however, is a video-capture card we can endorse. You can use it to spice up your Web page with short video clips or save video to your computer.

The Videum AV is an internal Peripheral Component Interconnect (PCI) video capture card that allows you to capture video from a television or VCR through the composite or S-Video connectors. You can also combine the card with

the Winnov Color Video Camera. Furthermore, the Videum AV records audio in sync with the video. Usually, video-capture devices leave this task to the sound card, which can get messy.

This card has one of the best software interfaces. It's so intuitive that it will take you only a few minutes to get the hang of it. The only problem with the software is it doesn't offer much in the way of video editing.

This card has a maximum resolution of 640 x 480 pixels, which is about the highest resolution you can expect from a consumer video-capture device. You can also choose from smaller resolutions, such as 352 x 240, which are better for video clips or Web pages.

We tested the card on a 300 megahertz (MHz) Pentium II computer with 128 megabytes (MB) of RAM, running Windows 98. We recorded a couple of clips at different resolutions, paying attention to the frame rate. To provide smooth video when capturing, the frame rate needs to be 25 to 30 frames per second (fps). Most video-capture devices will let you capture at 15fps, which is easier on the system resources and results in fewer dropped frames. The video quality at 15fps, however, isn't as good.

We captured video at a resolution of 352 X 240 pixels at 25fps. The image quality impressed us, and the card was able to capture the video without dropping any frames. We then increased the resolution to 640 X 480 pixels and tried again. Once again, the card didn't drop any frames. The video looked smooth, too.

At \$199, anyone interested in PC video capture will want this card. ■

by Michael Sweet



Videum AV

\$199

Winnov

(888) 494-6668

(408) 744-9777

<http://www.winnov.com>



Ultra 52B Monitor

\$179

Princeton Graphics Systems

(800) 747-6249

(714) 751-8405

<http://www.princetongraphics.com>

Monitors

Vibrant Colors & Consistent Lines

Most of us want as fancy a display as our desktops and budgets allow. For those computer users who are a little less frivolous, however, the Princeton Ultra 52B offers the quality of a bigger monitor at the price and size of a 15-inch display.

First, the on-screen display (OSD) menu on the Princeton proves more than adequate. Users can alter the size, shape, position, and brightness of the on-screen image. In addition, the OSD offers adjustments for any moiré or degauss distortion the screen may encounter. The easy-to-use OSD scrolling wheel and buttons

rest at the base of the black or cream bezel.

The Princeton Ultra 52B provides defined text with almost no blooming (defocusing of the text). With a dot pitch (distance between pixels) of .27mm, words look impeccably clear even in the corners of the display in Word and Excel documents. Graphics look sharp throughout the 13.8 inches of viewing space, as well. The monitor's high contrast allows it to define images with a variety of shaded hues and borders. Unfortunately, the screen provides such bright images that black backgrounds look grayish.

When we increased the resolution to the monitor's maximum of 1,280 x 1,024 pixels at a refresh rate of 60 hertz (Hz), we found even more defined graphics and bolder colors. The monitor flickers at the higher resolution, however, due to the slower refresh rate. We suggest you keep the display at a resolution of 1,024 x 768 so you can maintain the display's high refresh rate of 85Hz. As for other distortions, we did notice some moiré in the corners of the screen. Also, the upper-left corner pulls lines towards it like a dull magnet.

Princeton offers its 15-inch display and its three-year warranty on parts, labor, and the cathode ray tube for an estimated street price of \$179. For this price, you'll see vibrant colors and consistent lines. That's more than you can hope for from almost any other 15-inch. ■

by Michelle Nelson

Storage

High-Speed Storage

If you've been waiting to replace your aging internal diskette drive, your wait may be over. Imation has doubled or nearly tripled the speeds of its 120-megabyte (MB) SuperDisk drives. Its new Integrated Device Electronics (IDE) internal SuperDisk drive reads data up to 27 times faster than a diskette drive, according to Imation, when compared to previous generation SuperDisk drives that read at 10 times diskette speed. It doesn't hurt that the new SuperDisk drives can read, write, and format your old 3.5-inch high-density

(1.44MB) and double-density (720KB) diskettes in addition to more modern 120MB SuperDisks.

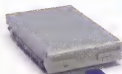
We tested an IDE internal SuperDisk drive (\$99) on a Windows 98 IBM PC with a 300 megahertz (MHz) Pentium II processor and 64 megabytes (MB) of RAM. The drive saved a 67MB Adobe Photoshop file in three minutes and three seconds, which is equal to 0.37 megabytes per second (MBps). This is faster than the external Universal Serial Bus (USB) SuperDisk (0.33MBps, \$169), but not as speedy as an external 100MB Iomega Zip USB (0.55MBps, \$129). We had hoped for a little

faster performance from the SuperDisk, but its diskette compatibility and extra 20MB capacity are its advantages over the Zip drive.

We didn't have any problems with this SuperDisk drive. You should be aware, however, that it takes a smaller internal power supply connection like a diskette drive and that your computer may only have one of these. If you are not replacing your diskette drive with the SuperDisk, you may need to buy an inexpensive adapter that will convert a standard white internal power plug to the smaller connector.

Like other SuperDisk drives, the IDE unit requires a cleaning every 40 to 80 hours of use with Imation's Head Cleaning Kit (\$12). Extra SuperDisks are \$99 per 10-pack. Imation offers a one-year warranty on the IDE SuperDisk drive and a \$20 rebate if you buy it before the end of 1999. ■

by Marty Sems



SuperDisk IDE Drive

\$99 (\$79 after rebate)
Imation Enterprises Corp.
(888) 466-3456
(651) 704-4000
<http://www.imation.com>

Printers

Laser Quality At A Consumer Price

Laser printers were once reserved for large offices that needed the speed, quality, and reliability of a good laser printer. For consumers and small office/home office (SOHO) users restricted to tight budgets, laser printers were simply out of reach. Today, however, many companies are breaking the \$300 price range on low-end laser printers.

One such printer is the Brother HL-1240. Rated by Brother International Corp. at 12 pages per minute (ppm), this small, compact printer produces decent text at a great speed for a unit in this price range. We printed a 10-page text file in the lowest quality to find this

unit's fastest speed. We averaged 10.3ppm during this test and the text quality was decent. Other printers certainly do a better job, but this one is hard to beat because of its price.

The printer did, however, have problems with graphic files. Our average fell to 8.6ppm when we introduced a few graphics and charts in a six-page text using a Word file. This is not a blazingly fast speed, but, again, it is good for the price. The quality of the graphics was a little suspect. Some streaking occurred in our smaller graphic files, with some



HL-1240

\$299

Brother International Corp.

(800) 521-2846

(908) 704-1700

<http://www.brother.com>

priced. Two different toner cartridges are available: one capable of 3,000 pages for an estimated street price of \$49.99 and one capable of 6,000 for \$79.99. The print drum will also need to be replaced every 20,000 copies; it has a suggested retail price of \$159.99. Overall, the estimated cost per page is as low as two cents.

This printer's print quality isn't as good as some of the more expensive systems we have reviewed, but it deserves consideration from anyone who wants laser printing on a budget. ■

by Chad Denton

areas of the same color appearing a little darker than others. Our one-megabyte (MB) Photoshop file also encountered some difficulty. The large image was slightly disjointed in a couple of areas, but many more expensive units also had similar difficulties with this file. An upgrade in RAM may have helped, but unfortunately, the standard 2MB of RAM is not upgradeable in this unit.

Consumables for this device were also reasonably

CD/DVD Drives

Current Leaders

The following summaries list *Smart Computing's* current top choices in the

optical drives category, as listed in the August - October 1999 edition of our quarterly *Guide To Buying Computers*. The Top Pick goes to the product offering the best mix of

performance and features. Best Value goes to the product representing the best price and performance. The Overall Favorite is the product we would buy

across all subcategories. The *Guide To Buying Computers* is available on newsstands and on our Web site at <http://www.smartcomputing.com>.

• CD-ROM Drive

Top Pick: Kenwood 42X True X
Best Value: Kenwood 42X True X

price: \$75
price: \$75

• CD-RW Drives

Top Pick: Hewlett-Packard
CD-Writer Plus 8200i
Best Value: Philips CD-RW 400

price: \$249
price: \$219

• DVD Drives

Top Pick: Pinnacle Micro Flex DVD-RAM
Best Value: Creative Labs PC-DVD Encore 6X

price: \$759
price: \$210

Overall Favorite

Hewlett-Packard CD-Writer Plus 8200i

\$249

(800) 637-7740

(408) 246-4300

<http://www.hp.com>

Working Around The Bombs

Coping With General System & Software Malfunctions

"WHEN SOFTWARE ATTACKS!" isn't a TV show; it's a very real occurrence for anyone who uses a computer. From an "Illegal Operation" message that shuts down a single program to the dreaded Blue Screen of Death that stops all computer operations in their tracks, software malfunctions can ruin both your data and your day.

The best solution for most of these failures is to turn off or restart your computer. This condemns your unsaved data to an early grave. We're here to help you understand the causes of software malfunctions and find some solutions.

Software Malfunctions Sources

There are several causes for software malfunctions: missing files, file version mismatches, memory conflicts, defective memory, and exhaustion of user or Graphics Device Interface (GDI) resources, which let applications display and print on output devices such as monitors and printers. Depending upon the error, the results may be as trivial as the inability to use a particular program or device, or as major as a complete system failure.

In an effort to avoid these errors, let's examine each one more closely. This will help us learn what causes them, how to detect them, and how to avoid them.

Missing Files

Upon starting your computer or launching an application, hundreds of different files get involved. During the startup process, most of the files are virtual device drivers (VxD), while applications rely heavily on dynamic link library (DLL) files. VxDs let multiple applications access the same hardware without causing conflict. DLLs are executable subroutines stored as files separate from programs that may use them. They allow for the efficient use of memory, because they are loaded into memory only when needed. When either of these



file types are deleted or become corrupted, the device or program that depends on that file can't work properly.

To detect a missing startup file, watch your screen when you start your PC. A missing file will trigger a "Cannot find a device file..." message that lists the file by name and location on screen, and you'll be asked to press a key to continue the startup process.

The most common cause of startup error messages like this one is the failure to use uninstall software routines correctly. If you have a program that runs automatically during the startup routine (such as Norton Utilities, Nuts and Bolts, or others) and you want to remove it, you should use the program's own uninstall option. Uninstall options are typically listed under a programs folder in Start menu or accessed by running the Add/Remove Programs from the Control Panel. If you delete the program folder, you'll cause error messages similar to those noted above the next time you start the computer. These messages appear because Windows can't find the files that match the startup commands placed into the computer's Registry when the software was first installed. You may need to reinstall the program if the missing file isn't backed up, but at least you know which files are affected and where they came from.

Renaming program folders or filenames may also cause problems. The time to decide what to call the folder you store that new program in is during installation and not afterwards.

If you delete or rename a program folder or filename for programs you run from the Start menu, you'll get a

Illustration: Mark Meyers

different error message. A dialog box notifying you of an "Error Starting Program" will appear onscreen listing the missing file by name, but not by location. If a shortcut on your Windows Desktop or Start menu points to a deleted folder or file, you'll get a similar "Missing Shortcut" error.

The missing file might be stored in the program's main folder or in a shared folder used by several applications from the same vendor. For example, the \SYMANTEC folder is used by Norton Utilities, Norton Antivirus, and other Symantec programs. Alternately, the missing file may be from the \WINDOWS\SYSTEM folder whose files are allegedly sharable by all your applications. In these scenarios, your best bet is to whip out your original CD-ROM or floppies and reinstall the broken program.

File Version Mismatches

Most users of Windows 95 or Windows 98 (Win9x, collectively) have installed various software programs to their systems, added patches to their original versions of Windows to fix Y2K or other problems, or upgraded from Win95 to Win98. Each of these actions requires copying software files to the system and replacing existing files in the process. Each time new software is introduced to a system, the likelihood increases that a new file copied to the system may not work with the existing files.

Because most of the files copied to the system during new program installations or Windows upgrades are DLL files; this condition is often referred to as DLL Hell. DLL files that can't work with existing software are one of the most common triggers for the all-too-frequent Illegal Operation message, which immediately shuts down the affected program without giving any chance to save unfinished work.

Fundamental design issues in Win9x make DLL Hell easy to enter. Like previous versions of Windows, Win95 was designed to allow files in the \WINDOWS\SYSTEM folder to be shared

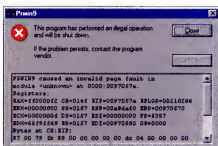
by multiple applications, allowing different programs to use a single copy of (for example) `Whatnot.dll` for operations. Unfortunately, since different versions of a single DLL file are created to support different programs, many programs insist on installing their version of a `Whatnot.dll` file over the existing one. Will the new version work with the new software? Of course. Will the new version work with the other software on the system? Possibly. If you run programs that need the older version of the DLL file, you'll get the Illegal Operation message when the program encounters the wrong file in memory.

You can minimize the chances of DLL Hell by taking the following steps before and during a software title's installation:

- Back up the `WINDOWS\SYSTEM` folder to another folder. Since most cases of DLL Hell start here, keeping your existing and working DLLs safe is a good idea.
- Most newer installation programs watch for existing DLL's during installation and will warn you if you're about to replace a "newer" DLL file with an "older" DLL file. Generally, you should keep the "newer" file and note the name of the file in case you have problems later.
- Most uninstall programs can also be used to monitor installations. This "watch & record" feature allows the uninstall program to work more accurately if you decide to remove the program later, but there's a second benefit: you'll know what files were changed. If you use this feature, enable the backup feature (if present) that saves the old version of any files replaced during the installation.

Win98 uses a variation of the third step above; it automatically backs up files that are replaced during either the initial upgrade to Win98 or when you install new programs. If problems crop up after installing Win98, you can use the Version Conflict Manager (VCM) to help you find out which files have been replaced, and you can restore the replaced files from the backups created by Win98. VCM can be found by going to Start, Accessories, System Tools, or installed from the Win98 CD-ROM.

Another way to avoid "Illegal Operation" errors caused by DLL Hell is to avoid running two different versions of the same vendor's software simultaneously. Even though you will probably use a different folder for the new version, if you try to



This shows a typical error message produced by improperly deleting a program file without uninstalling it, which removes the shortcut.

use both versions at the same time, you could have “Illegal Operation” errors. This is because each program may use different versions of a DLL file.

Illegal Operation

The "Illegal Operation" message is confusing to many users. If you investigate a typical "Illegal Operation" error message, you'll discover that your software is the criminal. Whenever an "Illegal Operation" message shows onscreen, the application and file that caused the problem are listed along with the type of error caused. These errors were known as General Protection Faults (GPF) errors in Windows 3.x. Regardless of name, the underlying reason for this error is that two programs are trying to use the same space in memory. However, knowing that fact alone won't avoid these types of errors.

Use the program and file (module) listed in the error message to research

the cause of the error since the "Illegal Operation" message doesn't point directly to the actual cause. If the module is listed as "unknown," the data file you were working with may be damaged. Try a backup copy, or see if the vendor has a file-repair tool available.

For Microsoft programs, you can use the program name and the phrase "Illegal operation" as keywords to search Microsoft's Web site for answers. We entered "Illegal operation Word97" in the Microsoft Knowledge Base (<http://support.microsoft.com/search>) and came up with over fifty documents pointing to possible causes. You can perform the same search by entering the file name along with "Illegal operation" as the keywords, or narrow down the cause (and the number of documents) by listing all three options in your search. Searching for Illegal operation Word97 kernel32.dll returns just nine entries.

A sampling of the entries in the Microsoft Knowledge Base indicates that DLL problems, software bugs, and running low on random-access memory (RAM) and/or disk space are some of the most common causes for the "Illegal Operations" message. The fixes will vary with the program, but downloading and installing software patches, uninstalling and reinstalling a particular application, and not running combinations of programs that trigger errors are typical solutions.

Blue Screen Errors

To determine the cause of a blue screen error, examine the error message carefully. Blue screen errors of many types that occur directly after installing new software point to a conflict between that software and the existing Windows configuration.

Blue-screen errors don't always make clear the true cause of a problem. The best way to deal with

them is to write down or print out the message, go to a working computer, and research the message contents on Microsoft's Web site. Use keywords such as "blue screen" and the filename(s) and/or "fatal exception" code listed (such as "fatal exception 0E at 0137") to help you determine the cause. Unfortunately, even when a particular file has been damaged or is missing, the blue-screen error doesn't always identify which file is causing

Five Steps To Preventing Software Malfunctions

- 1 Research compatibility of your system and software before you install a new program.
- 2 Protect your existing DLL shared files before you install a new program.
- 3 Watch for patterns when you have Illegal Operation or blue screen errors and research the cause.
- 4 Monitor your system resources.
- 5 Use uninstall programs to remove installed programs.

the problem. If your system displays multiple errors on a blue screen, the first error (at the top of the screen) should be researched first, since that error may have caused the others.

The solution to many blue-screen errors is a change in your Windows configuration; most often, you'll need to download an updated driver file and install it. Since some blue-screen errors are version dependent, make sure that you know exactly which version of Windows you're using. Use the General tab of the Win9x Device Manager to determine this information.

Running Out Of Resources

One of the most common questions we are asked about Windows is "Why can't I open more programs now that I have more RAM?" Most users are puzzled by this limitation,

which certainly seems illogical given that Windows will gladly use hard drive space as imitation RAM when the real stuff runs out.

Any Windows program consumes varying combinations of resources. There is a GDI heap resource, which is used to store graphical objects, such as menu buttons, on-screen objects, brushes, palettes, and others. A second resource is the USER heap, which is used to store menu and window information. The third, the SYSTEM resource, represents overall resources.

The limits for these resources in Win3.x were pitifully small, allowing only a few programs to be run at the same time before GPF or other errors resulted from resource exhaustion. Win9x allows many more programs to be run simultaneously because the limits are much larger. However, Windows NT is the only Microsoft operating system with no limits for most resources.

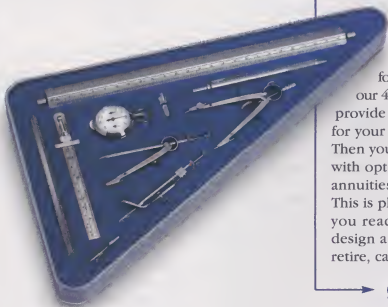
Resources are consumed as programs are opened and closed; any resource used when a program is opened would be restored when the program is closed. This is often not the case in practice. Many programs have memory leaks that cause GDI or USER resources to be lost as the program runs. That is why it's a good idea to restart Win9x periodically to refill these resources.

Most users would prefer to know about low resources before an "Illegal Operation" or "blue screen" error spoils their day. Windows contains a Resource Meter (go to the Start menu, Programs, Accessories, System Tools) that docks to the Toolbar and provides a real-time readout of GDI, USER, and SYSTEM resources. Similar tools are available in Symantec's (<http://www.symantec.com>) Norton System Works, Norton Utilities, and other programs. ■

by Mark Edward Soper

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plan ahead.

To help ensure that you'll have enough to retire, you need a comprehensive financial portfolio. As a 401(k) plan leader with over a century of financial expertise, The Principal® can help. We offer a diverse array of financial solutions that can prepare you for the unexpected. First, our 401(k) and pension plans provide a strong foundation for your retirement program. Then you can further diversify with options like insurance, annuities, and mutual funds. This is planning that can help you reach your goals. To design a plan for when you retire, call 1-800-986-3343.

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www.principal.com

Compiled by Chad Denton

Healthy Holidays

allHealth

<http://www.allhealth.com>

This health site includes sections about birth defects, men's, women's, and children's health, and emotional health. The Special Centers area has information on asthma, headaches, and other broad-ranging concerns. The Online Psych section offers a variety of interactive quizzes to help users gauge everything from relationships to mental-health issues. A community link even lets visitors discuss subjects including health and fitness and Autism.

Cyberdiet.com

<http://www.cyberdiet.com>

Forget fancy diet plans that promise fast-and-easy results. The sad news is weight loss is hard work that requires carefully monitoring your eating habits. At Cyberdiet.com, you can enter your weight, body frame, and activity level, and you'll get a breakdown of the number of calories per day that you need to maintain your weight. Enter a target weight to have Cyberdiet.com calculate a daily calorie intake that will help you reach your weight-loss goal. Cyberdiet.com can even generate sample menus that match an approximate calorie intake.

The Fitness Files

<http://rcc.webpoint.com/fitness/index.htm>

This is an excellent starting point for anyone looking to begin a fitness program. This site covers fundamental information, including tips for sticking with your workout routine, how to minimize injury risks, and advice on nutrition. You can also find out how to choose the right fitness program. The Fitness Files site even has a section comparing various types of home workout equipment, such as treadmills, rowing machines, and stair climbers.

Where else are you going to learn that treadmills break down more than any other type of home fitness equipment?

The Fitness Jumpsite

<http://primusweb.com/fitnesspartner>

Jump on over to The Fitness Jumpsite for information on everything you could possibly want to know about fitness. To make it easy to navigate, the site is in six main categories, including Getting And Staying Active, Nutrition Made Easy, Managing Your Weight, and Fitness Equipment. Each category contains links to numerous sites that provide a wide range of information, including an assessment of the effectiveness of those abdominal exercisers and information on how to manage your weight while you quit smoking. The site even touches on subjects such as Yoga and meditation.

Just Move

<http://www.justmove.org>

This site from the American Heart Association (AHA) will help you get off your recliner and into a healthy way of living. Just Move offers valuable information and services that will help you lead an active life. An exercise diary lets you set goals, participate in discussions, get feedback from health experts, and even communicate with your own online personal trainer to make sure you stay motivated. The site also offers advice for a number of people, including those looking to become more active, those who lead an active lifestyle, and those with special health considerations.

National Library of Medicine MEDLINEplus

<http://www.nlm.nih.gov/medlineplus>

This site acts as a hub to a wealth of medical information. An online database allows you to search for med-



ical documents on any subject you choose (some documents require you to order them online). Online medical dictionaries provide definitions of those hard-to-pronounce medical terms. You will also find a list of medical organizations and links to their online presence.

OnHealth

<http://www.onhealth.com>

OnHealth has a variety of information on everything related to health. Its interactive tools include calculators for self assessment and health-related quizzes. You can also customize OnHealth through its My Wellness service to deliver information important to you. For instance, you can list allergy and air quality information on your My Wellness page along with articles of interest.

Shape Up America

<http://www.shapeup.org>

This site provides a ton of information on fitness and health. You can calculate your body mass index (BMI), assess your level of fitness and plan an exercise and diet to improve or maintain your level of fitness. A library section gives users access to written guides on a wide range of health-related topics. A support section will even help provide you with encouragement and support when needed.

Quick Fixes

Most software can benefit from a few updates, patches, and add-ons downloaded from the Internet. This month we focus on media players.

QuickTime 4.0

The latest entry into the streaming media market from Apple provides some of the best quality streaming audio and video to date. It does not use the RealAudio or RealVideo formats from RealNetworks, but it does support a wide range of other files.

<http://www.apple.com/quicktime>

RealPlayer G2

RealNetworks' newest player includes support for all media types, including streaming audio and video in RealNetworks' RealVideo and RealAudio formats. You can download RealPlayer G2 free of charge or RealPlayer Plus G2 for a fee.

http://www.real.com/products/player/index.html?src=dbutton_all

Windows Media Player 6.4

This player from Microsoft supports a large number of file formats, including audiovisual interleaving (AVI), WAV, MPEG Audio Layer 3 (MP3), QuickTime, and Windows Streaming Media (ASF). Unfortunately, Media Player doesn't support RealNetworks' formats.

<http://www.microsoft.com/windows/mediaplayer/en/default.asp>

That's News To You

Finding the appropriate Usenet discussion group to match your interests can be a monumental task. So each month we scour the tens of thousands of newsgroups out there and highlight the newsgroups that delve into popular topics. If your Internet service provider (ISP) doesn't carry these groups, ask it to add the groups to its list. This month we selected the topic of books.

Alt.marketplace.books. This is an excellent resource for those who are looking to buy or sell rare books. You will find several links to rare books up for auction on eBay (<http://www.ebay.com>) and special requests you just might be able to fill. Dust off that old Harvard Yearbook from 1924, someone wants to buy it.

Alt.books.anything. If you're eager to discuss some of your favorite books or authors online, there are many great groups here that focus on a specific author or genre. You will find popular authors ranging from George Orwell to John Grisham, and genres ranging from ghost-fiction to pure fiction.

Share The Wares

Some of the best apples in the online orchard are the free (or free to try) programs available for download. Each month we feature highlights from our pickings.

Sandra 99

SiSoftware's Sandra 99 (the "System ANALyser, Diagnostic and Reporting Assistant") is the ultimate tool for computer geeks. Sixty-two reports, known as modules, provide information on everything you always wanted to know about your hardware. The software can provide information, such as the model and serial numbers, for any piece of hardware. Sandra can also test each component for various capabilities such as monitor refresh rates and 3D-NOW! compatibility. This information can often be invaluable when installing new hardware or talking with technical support. The shareware version is free, but some of the modules will be disabled until the program is registered. The available modules, however, can give you an in-depth report about your PC.



SiSoftware's Sandra 99 allows you to research a wealth of information about your system.

Sandra even includes benchmark applications to help give you an idea of how your computer stacks up to others. Benchmarks for individual drives, the processor, and the memory are available.

Sandra is available for free download from <http://www.sisoftware.co.uk/sandra>. An extra \$29 will unlock all the modules.

Monthly Bill Manager 99

Having trouble sticking to that budget? Then you need Monthly Bill Manager 99, which is a simple tool strictly for maintaining billing information. It doesn't have some of the fancy features and graphs like Microsoft's Money or Intuit's Quicken but that is why this program is easy to use.

The program starts by running you through an automated process to create your accounts. Then, you enter your monthly bills. In no time you'll have a budget. If you have information in Quicken, you can import and export transactions (the software doesn't support Money). You can even automate payments.

You can download Monthly Bill Manager 99 from <http://www.mjkw.com/mbmwin99.htm>. If you want to use it beyond the 45-day trial-period, it costs \$43.

How Far We've Come

In the last decade we've progressed from DOS to Windows 2000. We've upgraded from 486 processors to 650 megahertz (MHz) processors. Our 9600 bits per second (Kbps) modems have speeds of 56 kilobits per second (Kbps) or even faster Digital Subscriber Line (DSL) or Integrated Services Digital Network (ISDN) connections. We've gone from no World Wide Web pages to 800 million pages. Here's a closer look at the evolution of computer technology in the 1990s.

Computer Systems



1990: Top-notch desktop system: IBM PS/2 Model 25-286 with 10MHz Intel processor, 16MB hard drive for \$2,215

1997: Sub-\$1000 PCs available

1999: Top-notch desktop system: IBM PC 300PL Series with 600MHz Intel processor, 13.5GB hard drive for \$1,970

1998: Apple's iMac introduced

Printers



1990: Dot matrix printers

1991: Color laser printers and color scanners

1999: Inkjet and laser printers with 1,440dpi

1994: Seiko Epson's Stylus Color Inkjet with a resolution of 720dpi

E-mail



1990: Lotus Notes groupware

1999: 263 million e-mail mailboxes worldwide, according to the Yankee Group

2001: 50% of Americans, or 135 million people, will use e-mail, Forrester Research predicts

Modems



1990: 9600 bps modems

1994: 28.8Kbps modems

1995: 33.3Kbps modems

1996: 56Kbps modems

1999: 35 million U.S. households connect through a dial-up modem, 2.9 million through a cable modem, 2.2 million through an ISDN or DSL line, and half a million have satellite/wireless connections.

Operating Systems



1990: MS-DOS, IBM's OS/2, Macintosh

1990: Microsoft Windows 3.0 sold 100,000 copies in the first two weeks on sale. It featured a revolutionary graphical user interface.

1991: Linux operating system formed

Microprocessors



1990: 486DX CPU microprocessors

1993: 60MHz Intel Pentium processor

1996: 200MHz Pentium II processors

The Internet



1990: Tim Berners-Lee developed Hypertext Markup Language (HTML)

1991: The World Wide Web launched

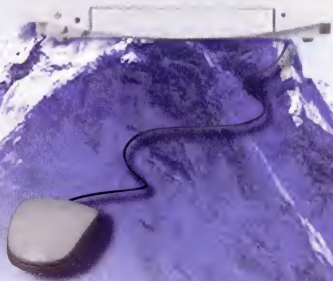
1992: One million Internet host computers—computers directly linked to the Internet and not hidden behind an intranet's firewall

Web Users Worldwide

Since the first World Wide Web server launched in 1991 and the Internet began attracting the masses, Web usage has grown to more than 215 million users. Today, the United States constitutes more than half of the worldwide Internet population. Here is a June, 1999 breakdown of visitors from foreign and domestic domains. Each of the 215 million WWW viewers accesses the Web through a domain such as .com, .net, .edu, .org, .mil, and .gov.



Sources: StatMarket, June 99 and Global Reach, August 99



1992: Windows 3.1 sold 1 million copies within the first two months

1998: Windows 98 launched

1995: Windows 95 sold 1 million copies in four days

2000: Windows Millennium Edition for consumers expected

1999: 600MHz Pentium III processors

2000: 800MHz+ Pentium III processors expected

1999: 700MHz AMD Athlon processor

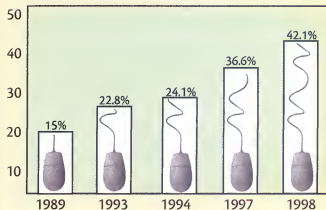
1993: Mosaic is the first graphical Internet Web browser

1999: 800 million Web pages on the Internet

1994: Netscape and Yahoo! search engines created

PCs In The Home

Home computers were a luxury in the United States a decade ago but now have skyrocketed into the mainstream.



Sources: NTIA, U.S. Bureau of the Census

Need help with your hardware or software?
Looking for simple explanations on technical subjects?
Send us your questions!

DOS computing:

Q: Someone told me that before I set out to learn a little bit about MS-DOS and buy a book about it, I need to know which version of DOS I have. How can I find that information?

A: Just type ver at the DOS prompt and press ENTER. This will produce an on-screen message that says something like, "MS-DOS version 6.20." This even works in a DOS session running inside (or "under") any version of Windows.

If you're using DOS version 6.xx or 5.xx, you can learn a bit about it just by typing help at the DOS prompt to reach a moderately sophisticated help system.

Although *Smart Computing's Guide To DOS* is sold out, you can still read it on our Web site. Just go to <http://www.smartcomputing.com> and click the Master Index Of Issues link on the lower-left side of the home page.

Windows 95/98:

Q: I can't get the print screen key to work. I hold down shift and print screen together while the item I want is on the screen, but nothing happens. How do I get this to work?

A: In the old DOS days pressing PRINT SCREEN while holding down ALT would send an image of whatever was on the monitor directly to the printer. We're not sure this is progress, but these days in Windows (including Windows 3.1) you must do this indirectly.

While the image you want is visible on-screen, press the PRINT SCREEN key. This copies the image to the invisible Clipboard. Then open the Paint accessory program or some other paint/illustration software. To open Paint click Start, Programs, Accessories, then select Paint. Now select Paste from the Edit menu (or press CTRL-V). An image of the screen's contents should appear within Paint. From there you can edit, print, or save the image.

Note that there are two different screen-capture key-stroke combinations.

PRINT SCREEN by itself captures everything on the screen (the entire Desktop.) PRINT SCREEN pressed while holding down the ALT key captures just the active Window you are working in when you press those keys.

Computer Hardware:

Q: I purchased a computer that is supposed to have a 450 megahertz (MHz) Pentium III CPU, but when I boot up the computer the screen reports that I have a 300MHz Pentium. Can you tell me why?

A: There's always a chance that there was a mix-up in the ordering and that you actually got a 300MHz CPU. The only way to determine that is to open the case and look carefully at the CPU itself.

If you find it's actually a 450MHz CPU, your motherboard settings may be incorrect. When someone installs a CPU they often have to set jumpers (tiny switches) on the motherboard (or at least a setting in the BIOS) to tell the motherboard to run that CPU at a certain speed. If they set these jumpers to 300, that's the speed the CPU will run at and be "seen as," even if it's capable of more.

Because it's a PIII machine, it's probably less than a year old and under warranty. That makes it the seller's responsibility to determine why it's reporting or running at only 300MHz. Unless you want to risk voiding your warranty by going inside the case, we suggest calling the maker or taking the PC in and having them either change the CPU or correct the jumper settings.

Q: I have a Hewlett-Packard computer with a 19-inch monitor. When I go to Start and select Shut Down, the main computer turns off, and the little green light on the monitor turns orange. Should I turn the monitor's power off or leave it on?

A: Apparently you have a reasonably new computer and/or monitor. Newer computers are designed to shut down virtually all their power and send a "go to sleep" signal to the monitor. Newer monitors go to sleep, indicated by a yellow light, if no signal is coming from the computer. In what's called "sleep mode" the monitor uses a tiny bit of power (similar to the state of a VCR that's plugged in but not playing).

A monitor coming out of sleep mode comes back on a bit quicker and with a bit less wear than if you switch it completely off. Unless you're not going to be using the monitor for weeks, the only reason we can think of for shutting it fully off would be if you live in an area with power problems (known for frying electronic equipment with surges) or frequent lightning storms. In that case, shutting it off could someday save you from a destroyed monitor. Power companies do not take responsibility for surges and overvoltage regardless of whether lightning, their own equipment, or even a plane crashing into a power line causes it.



I recall reading that several factors affect the selection of in-house telephone wiring, particularly if you're going to use a computer. For the home I'm having built, should I request a certain type of phone line wire that's more suitable for Internet connections and other uses?



You're wise to plan ahead. Pre-wiring a house with every possible computer and phone cabling you might someday need is a small investment that can save you big bucks and hassles compared to playing catch-up later.

There are increasing uses for above-average phone wires besides just calls and connecting to the Internet through a dial-up Internet service provider (ISP). Although some home networks are capable of running on ordinary older Category-2 and Category-3 phone wire, those tend to be slower than normal Ethernet networks. Spending a few cents more per foot on a higher class of wiring will provide more and better options.

We recommend Category-5 wire, which has four sets of twisted-pair wire and can carry up to four phone lines. It is specifically suitable for many computer and network

uses: ISDN, conventional and high-speed Ethernet, token ring, Asynchronous Transfer Mode (ATM), and even devices that normally plug into a computer's RS-232 serial port. You may never need these higher-speed diverse computer uses, but it costs little more to preserve the option than to rule it out. Wiring an entire house with Category-5 wire instead of the older Category-2 and Category-3 phone wire might add \$25 in wire cost,

and it could increase the home's resale value as intensive computer use becomes more common in the future.

To learn more about phone and computer wiring for a home, look at <http://www.derossi.com/hometech/techwire/tp.html>, http://www.wildtracks.cihost.com/homewire/wg_types.html, or any number of other Web sites loaded with cable decision information.

This Old Computer:



I don't have a manual for my Leading Edge notebook PC, and I can't get any technical support by phone. I've plugged a monitor into the PC, but the monitor displays nothing when connected to the PC. How can I fix it?



In the mid-1980s Leading Edge Computer Products was one of the first companies to widely market reliable clones of the early IBM microcomputers and had a significant role in the early growth of the microcomputer revolution. The company had pretty much disappeared by the 486 era. We found no address, phone number, or Web site for that company.

Most notebook computers force you to choose between displaying on their screens or the external screen, and they toggle (change) between display modes using special keystrokes. The Leading Edge was an exception that let you run the LCD screen, the external monitor, or both simultaneously. Press the **FN** and **T** keys together to toggle among the three modes.

Users of other notebook PC models may be able to look up their own keystroke combinations for this task at http://www.ask.com/English/TechSupport/LapTop/laptop_activation.htm.

Online Communications:



The Save Password box is grayed out in Windows 98's Connect To Internet screen. That means that I have to manually enter my password every time I want to log onto my ISP service. Is there a way to make the Save Password option available?



One simple answer may be that you're not entering a password when you log into Windows itself. When you establish a Windows password, you can set up a Windows Desktop customized for your needs, which includes an Internet connection that remembers your password. You can use Windows without entering a password, but this displays a default Desktop with no personalized settings, including no remembered Internet passwords.

Another cause of the problem could be that a couple of files associated with password storage could be damaged. We'd try simply restoring these files from a recent backup made before the problems started. Restore files ending with **.PWL**, specifically the one called **Rna.pwl**.

If you have no recent backup from before the problem started, try uninstalling and re-installing Dial-Up Networking (DUN). Before removing DUN, save or write down any info in your ISP's DUN connection; you'll need to put it back in later. To do that, go to Start, Accessories, Communications, Dial-Up Networking. That should open a window with two or more icons, including one that belongs to your ISP. For

When you establish a
Windows
password,
you can set up a
Desktop customized
for your needs.

example, if your ISP is called Zorch-net, that name or Zorch-net's phone number may be on the icon. You can double-check whether you have the right icon by double-clicking it and checking whether it establishes a normal connection to your ISP. Once you decide which DUN icon is the right one, close all open windows/programs except the DUN window. Then hold down the CTRL key and drag the DUN icon from the window to the Desktop and drop it there. That should leave one copy of the DUN connection in the window and a spare copy (to later drag back after the DUN re-install) on your Desktop.

Now, in Control Panel select the Add/Remove Programs option and click the Windows Setup tab. In Win98 double-click the Communications options to reveal Dial-Up Networking, then uncheck it. Press OK until all the dialog boxes are closed. After rebooting, go to the Windows Setup tab again and re-check the Dial-Up Networking option to re-install it. You'll need your Win98 or Win95 CD-ROM for the re-install. Then try your connection again.

Note that the Save Password option is normally inactive until you have successfully connected to the ISP at least once by manually entering your password during login.

As a last resort, try deleting your Windows password file. Search on C: for *.pwl and rename .PWL files that Find locates. After rebooting, Windows will ask you for a new password and username. If you don't want to have to re-enter a password every time you log on to the computer, don't enter one there.

You can find more details on this problem at <http://support.microsoft.com/support/kb/articles/q148/9/25.asp>.

Q: I once saw a reference to something called a "preview pane," which is supposed to support the viewing of a message in Outlook Express without opening it first. Where can I find this tool?

A: The preview pane should be visible by default. First you must have one of Outlook Express 5's folders (such as the Inbox) highlighted (rather than being in OE's main opening screen) to see the preview pane. Normally it should occupy the lower-right area of OE's screen. As you highlight a message in the Inbox, the message's contents should appear in the lower-right corner. If you can't see the preview pane, adjust the OE window to occupy the full screen.

You can reposition or even hide the preview pane entirely. To find out whether that happened to yours, open the View menu, click Layout, and make

sure there's a checkmark in the box next to Show Preview Pane.

To change the preview pane's size, point to the divider between panes until you get a double arrow, then drag the divider up or down.

Word Processing:

Q: I make many drawings with Microsoft Word 97 for my job in the areas of quality control and packaging. Sometimes when I want to add or move a line, parts of my drawing or the fill color disappear. Sometimes part of the drawing goes off the side of the page. When I called tech support, they said to remove and re-install Word. Can you suggest any other remedies?

A: If tech support was suggesting re-installing, they must suspect some type of corruption in Word's own program or configuration files.

We always recommend keeping a current full backup of your total drive for, among other reasons, occasions like this one. If you made a backup before this problem started, you have two alternatives that are easier than a re-install. Be sure that before restoring, you back up any files you created or changed since your last backup (otherwise the restore might overwrite them.) The simpler, quicker fix would be to restore only the contents of the Word (or Office) folders. That might be enough. Otherwise, restore the entire system to its pre-problem state.

Regardless of whether restoring files is an option, we have a suggestion. The elaborate technical drawings you sent as examples of your work in Word were impressive, but you're really pushing Word's drawing abilities, which may be part of the reason for the odd behavior you're seeing. It looks like it's time for you to partly leave the familiar Word environment and graduate to at least a simple two-dimensional drawing/drafting program. As versatile as Word is, it's still a word processor, and many inexpensive draw and drafting programs could better suit your needs. One that looks suitable for your drawings, uses familiar Word drawing tools, and lets you put its drawings right into Word documents is Imagination Engineer (now changing its name to SmartSketch) from Intergraph Corp. (<http://www.ingr.com/imaginele/default.asp>). We mention it because it's relatively simple and widely available in a free version on the CD that's part of the Windows 98 Resource Kit. Three other products in the same league are TrueCAD (800/777-7978, downloadable version available at <http://www.choicecomp.com/download.htm>), AutoSketch (800/964-6432, <http://www.autodesk.com/products/asketch/index.htm>), and

SmartDraw (available for free 30-day trial download at <http://www.smartdraw.com/>).

Miscellaneous Software:



What are files ending in .PPS? I've downloaded quite a few of them and received a few as e-mail attachments.



A .PPS file is usually created when someone saves a Microsoft PowerPoint file as a self-launching slide show. When the recipient double-clicks that .PPS file, the slide show starts running.

Of course the person trying to view the slide show must have PowerPoint installed on their system for the show to run. But the .PPS format allows much quicker and easier launching than the regular process of waiting for PowerPoint to open, opening the presentation file, choosing View, and then selecting Slide Show.

To create such a .PPS file in PowerPoint, open the File menu and select Save As. When the Save As dialog box opens, click the arrow to the right of the Save As Type box to open the drop-down list. Select PowerPoint Show (*.PPS) and type a name into the File Name box. Click OK to close the dialog box and save the file.

You can always edit a self-launching slide show of this type. You can open it into PowerPoint's normal editing mode by using File, then open and selecting the name and location of the .PPS file.

In addition to supporting .PPS files, PowerPoint versions (since the one included with Office 95) offer a similar but even more versatile feature called Pack and Go. This produces a truly autonomous self-running slide show with the .PPZ extension. Open the File menu and select Pack and Go to reach the Pack & Go Wizard. When you get to the step called Viewers, you can tell PowerPoint to include a self-controlled viewer by checking the box that says "Yes, please include the viewer." The file size will increase when you include the viewer, but folks without PowerPoint will now be able to view your work.



What determines whether to install a program over the existing one or uninstall the program and then re-install?



Usually you should first try installing on top of the existing program. If that doesn't do what you want, try removing the old program and re-installing. The advantage of installing over the existing program (aside from the

obvious one of saving the work that goes with uninstalling the old copy) is that if it has some setting and configuration work in it (for example, setting default margins or calibrating a joystick), installing on top of the existing program may save you from doing that work again.

On the other hand, if there's a problem inside those configuration settings (and the problem was what prompted you to re-install), installing on top of the program, rather than installing "clean," may just preserve the problem.

Another situation in which you should probably uninstall before re-installing is if you think the program's first installation was in a location where it shouldn't have gone or where you don't want it.

Finally, if your hard drive is nearly full and you're talking about re-installing a large program, you may have to remove the existing program before re-installing. Some install routines are clever enough to check your hard drive for enough free space, but not clever enough

to understand that you don't need that space if you're re-installing on top of the old program. They will refuse to install, and you'll have to cater to them by removing the old copy to "make space."

If you decide you must uninstall before re-installing, investigate whether you can save some of your data or configuration work in the process. For example, in Word you might make sure you save your old .DOT (template) files if they represent a lot of your work. In you're uninstalling Outlook, make sure you're not removing your complete e-mail address book. ■

Installing

on top

of the program

may just

*preserve
the
problem.*

Get straight answers to your technical questions. Ask Smart Computing! Send your questions, along with a phone and/or fax number so we can call you if necessary, to: Smart Computing Q&A, P.O. Box 85380, Lincoln, NE 68501 or to editor@smartcomputing.com. Please include all version numbers for the software about which you're inquiring, operating system information, and any relevant information about your system. (Volume prohibits individual replies.)

Answers to users' most common questions.

Viruses

FAQ: *What is a computer virus?*

A computer virus is a self-replicating program that attaches itself to other programs found on a computer—sometimes interrupting the general functioning of the machine and applications, sometimes doing nothing more than making copies of itself and consuming computer memory.

FAQ: *How many viruses are out there?*

According to Joe Wells' WildList (<http://www.wildlist.org>), the widely accepted online authority on viruses, only about 260 viruses invaded machines in 1998. More than likely, the high numbers of infectors reported each year are simply variations of a few hundred strains of actual computer viruses.

FAQ: *Can I get a virus just by reading e-mail or browsing the Web?*

No, but the introduction of viruses such as Melissa (which attacked through e-mail attachments) caused some confusion about how viruses can and cannot get onto your computer. Because they are programs, viruses must be activated, just like any other application. They can do no harm residing within unopened text files or on the Web page you're browsing. You must first download an item that contains a virus to your computer (through e-mail, the Internet, or a diskette), then execute the program by opening the application. E-mail often produces confusion because viruses can reside in a message's attachments. Viewing an attachment requires an executable command, so viruses contained in attached text files could activate when a user opens the attachment itself.

FAQ: *Do I really have to worry about downloading a virus, or is it mostly hype?*

Your chances of becoming infected are small, but the damage viruses can do makes it foolish to gamble with a lazy antivirus strategy. The danger is real enough and the consequences potentially harmful enough that you should always have an updated antivirus program running on your PC. Even relatively benign viruses can eventually cause your PC to stop responding.

FAQ: *What can I do to protect my PC from viruses?*

In addition to installing and periodically updating antivirus software to deal with new viruses, you should adopt a few safe computing practices to increase your chances of avoiding system invaders. Common-sense preventative measures include only downloading items from Internet sites you trust and opening only e-mail attachments you're expecting from people you know. If you must use files from an unknown source, always scan them for viruses with your antivirus package before opening them. You should also avoid sharing diskettes with other users and be wary of "Trojan Horses," which are applications that sound useful but turn out to be malicious programs.

FAQ: *How can I tell a virus has infected my machine?*

Everyone's computer occasionally malfunctions or fails to perform perfectly, so problems do not automatically signal a viral invasion. If your antivirus software indicates the presence of a virus on a single file, it's not quite time to panic either. These applications can produce false alarms.

Some signs that your system may be infected include one or more reports of several files infected with a known computer virus and an increase in size, by about the same amount, of some executable files (files with .COM and .EXE extensions). You can often check this by comparing the size of these files to the ones on the CD-ROM or diskette from which you originally obtained the files.

FAQ: *What can I do if my computer becomes infected?*

Your antivirus software can eliminate most infections. Just click the OK or Yes button when the application asks you whether it should remove the virus. Another option could be reinstalling infected files. If the virus has had too much time to replicate or if the virus resists erasure (some can remain on the hard drive even after you've deleted the infected file), you may have to reformat your entire hard drive and reinstall all your programs. In very rare cases, the virus may attack sensitive system files or other data your computer needs in order to operate. In that situation, consult a professional technician for help. In any case, if your antivirus program cannot erase the virus, check with an expert before erasing important files; you may be able to pluck some data out of the offending viral code. ■

*May the road rise up to meet you.
May the wind be at your back.
May your Internet dial-up number never be busy.*

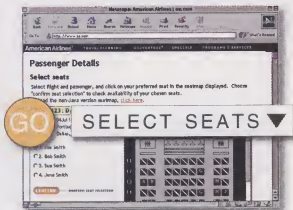
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1999 Article Index

Listed by Month

January

DOS: Built-In Virus Protection	14
Windows: Working With .INI Files	15
Windows 95/98: The Windows Registry	17
Windows 98: The New & Improved Startup Diskette	19
Basic Training	
(changing refresh rates, using Compare in backup tools, deleting font files)	21
Windows Family Start Sheet	26
Which Windows Is For You?	30
Windows To The Future	35
Word Processing Power Tools	36
When Rhetoric Go Bad	40
A File Format For Everyone (Adobe Acrobat)	42
Distance Education	44
Take It To The Limit (software system requirements)	49
Uncovering Microsoft Office's ValuePack	51
Read E-Mail From The Road	54
WordPerfect & An Overview Of What's New	56
Lotus 1-2-3-97: What's New For Upgraders	57
QuickDraw Deluxe 98: Introducing QuickDraw 98	58
Print Shop 6.0 Deluxe: Introduction	
To A New Version	61
Gong Online: In & Out Of HTML E-mail	62
Microsoft Word 95: Upgrading To 4.5	63
Microsoft Word 97: Writing In Foreign Languages	64
Web browsers: Updating Internet Explorer Components	65
Microsoft Excel 97: Protecting Your Data Part II	66
PowerPoint 97: Saving Presentations For Web Use	67
HTML: Framing Your Page	68
Quick Tips: Secrets To Succeeding At Common Tasks	69
Team Up On Documents	72
Upgrading Processors	77
Hardware Reviews	
Portable PCs: NEC Versa LX	83
Modems: Viking 56Kbps External Modem	84
Video Cameras: CVideo-Mail Professional	84
Input Devices: Pablo Drawing Tablet	85
Video Cameras: Kodak DVC323	86
Monitors: P110 21-inch Trinitron	86
Digital Cameras: QV-7000SX	86
Decipher Common Error Messages	87
Organize Your Bookmarks	91
Expand Your Web Search	93
Computer Anatomy, Part I	98
DOS: Avoiding Common DOS Mistakes	14
Windows 3.1: Improve Performance With SmartDrive	15
Windows 95: Communication Tools	16
Windows 95: Exploring My Computer Options	17
Windows 98: Check Your Registry	18
Windows 98: A View To A File	19
Basic Training	
(understanding and editing program information files, exploring files and directories)	20
Quicken vs. Money	24
100% Made simple (tax software)	28
What's Hot, What's Not	32
Online Banking 101	38
Build To Order (ordering PCs)	42
Maintain A Clean Machine	44
Intro To E-commerce	46
Must-Have Mobile Utilities	52
QuickDraw Deluxe 98: 10 Starter Tips	55
Web Browsers: Internet Explorer 4.0's Explorer Bar	55
HTML: Common Web Design Mistakes	58
Microsoft Excel 97: Using AutoFilter	59
Lotus 1-2-3-97: Changing The Worksheet Display	60

February

PowerPoint 97: Summarizing Your Slides	61
Print Shop 6.0 Deluxe: Photo Enhancements & Special Effects	62
Gong Online: Reigning In The Palace	63
Microsoft Word 97: Microsoft Photo Editor	64
WordPerfect 8.0: Working With TextArt	66
Microsoft Word 95: Using Formulas In A Spreadsheet	67
Quick Tips: Secrets To Succeeding At Common Tasks	68
Multimedia Authoring	70
Upgrading RAM	74
Hardware Reviews	
Desktop Systems: Brio 7100	78
Pointing Devices: Remote Combo Pak	79
Digital Cameras: DC210 Plus	79
Monitors: VS-F15	80
Portable Computers: TinyNote 2007NS-01	80
Modems: V.90 56K Voice Faxmodem Pro	81
Speakers: Monsoon MM-1000 Multimedia Speaker System	81
Save Data From Dying Drives	82
Online Investing Resources	86
Standardize Your Modem With V.90	91
Upgrading To AOL 4.0	92
Computer Anatomy, Part II	98

March

Windows 98: System Information Tools	14
Windows 98: Year 2000 Update	15
Basic Training	
(deleting programs, creating file associations, adding startup programs, removing startup programs, adjusting date and time)	16
Publisher Picks (desktop publishing)	20
Mission-Critical Countdown (Y2K)	26
Save Your Software From Y2K	30
Help For The Journey To Y2K (utilities & Web sites)	36
Surviving Hardware Market Shakeup	39
The Little Diskette That Couldn't	42
What Works Where? (reading system requirements)	45
Compound Documents	47
Word 97: Working With Captions	50
PowerPoint 97: Tips For Effective Toolbars	51
Web Browsers: Browsing Faster In Netscape	52
WordPerfect 8.0: Using Master Documents	53
Microsoft Excel 97: Using Chart Types	54
Gong Online: Finding Official Tax Forms	55
Microsoft Works 4.5: Download Graphics & Templates	58
Lotus 1-2-3-97: Summarize Data With Outlines	59
QuickDraw Deluxe 98: Using QuickDraw In A Small Business, Part I	60
Print Shop Deluxe: Creating Pages For The Web	61
HTML: Cascading Style Sheets	62
Quick Tips: Secrets To Succeeding At Common Tasks	64
PC Security, Part I (standalone PCs)	66
Prepare Your Hardware For QuickDraw	70
Hardware Reviews	
Portable PCs: Gateway Solo 3100XL	75
Input Devices: Logitech NewTouch Keyboard	76
Monitors: EIZO FlexScan 1360	76
Scanners: Microtek ImageDeck	77
Scanners: IBM IdeaScan	77
Video Cards: Creative Labs 3D Blaster Banshee	78
Printers: Canon BJC-5000	78
Troubleshooting Inkjet Printers	80
The Net's Legal Pitfalls	85
Make The Switch (changing ISPs)	90
Web-Based Calendars	94
Choose Your Format (Save As options)	98

April

Windows 98: Maintenance Wizard Optimizes Performance	14
Windows 98: Version Conflict Manager	15
Basic Training	
(setting up screen savers, defragmenting your hard drive, checking physical memory, moving files)	16
Performance Optimization	20
Air Bags For Your PC (anti-crash utilities)	24
Spare-Time Solutions	26
Books Embrace The Internet	30
Fixing Computer Bottlenecks	32
Click The Right Way	38
Office 2000: The Package	40
Office 2000: The Parts	46
Speed Down The Road (portable PC tips)	52
Microsoft Word 97: Editing Web Templates	56
Gong Online: Check External Accounts With Web E-mail	57
HTML: Choosing Web Graphics	58
WordPerfect & Sorting Text	59
Lotus 1-2-3-97: Linking Data To Geographic Maps	60
PowerPoint 97: Jazz Up Presentations	
With Animation Effects	62
Print Shop Deluxe: Importing & Organizing Digital Photos	63
Web Browsers: Set Up Multiple Outlook Express 5 Users	64
Microsoft Excel 97: Automating Tasks With Macros	65
QuickDraw Deluxe 98: Using QuickDraw In A Small Business, Part II	66
Microsoft Works 4.5: Creating User-Friendly Spreadsheets	67
Quick Tips: Secrets To Succeeding At Common Tasks	68
PC Security, Part II (viruses)	70
Speed Up Startups	74
Upgrading Monitors	76
Hardware Reviews	
Desktop Systems: Compaq Presario 5050	79
PC Technology: Microsoft MP-900 Cordless PC Phone System	80
Monitors: Princeton DFP 500 Flat-Panel Display	81
Multifunction Devices: Hewlett-Packard Office Jet Pro 1175Cse	81
Speakers: Benzin BW2000 Speakers	81
Inkjet Printers: Epson Stylus 740	82
Audio: E.W. Bridge Pocket BlueMate 400	82
Troubleshooting World Wide Web Sites	84
Rev Up Your 'Net Connection	87
Timesaving Web Sites	92
Have Windows Your Way (customizing the Desktop)	98
May	
Windows 98: Quick Launch Toolbar	14
Windows 98: Using Network Neighborhood	15
Basic Training	
(installing and updating device drivers, changing desktop icons, mastering sound files)	16
Don't Leave Home Without Them (travel agents vs. the Web)	20
All Aboard The World Wide Web (travel sites)	24
Your Wallet Gets Smarter (Smart Cards)	30
Travelocity Takes Off	32
American Airlines Gets Personal	35
Web Tips: Ideas That Make The Most Of Online Time	40
Microsoft's Online Support	41
Using Kits To Build Networks	43
Best Of Both Worlds (portable PCs at the desk)	47
QuickDraw Deluxe 98: Setting Up A Budget, Part I	49
Web Browsers: Search With Internet Explorer 5.0	50
Gong Online: Checking AOL's NetMail	51
Microsoft Works 4.5: Converting Files	52
HTML: Ideas For Creating A Great Web Site	53
Microsoft Word 97: Adding Sound To Your Web Page	56
WordPerfect 8.0: Merging Your Documents, Part I	57
Lotus 1-2-3-97: Setting Sheet Properties	58
PowerPoint 97: Creating & Modifying Tables	60
Print Shop Deluxe: Preparing Images For The Web	
With Photo Organizer	61
Microsoft Excel 97: Attaching Macros To Buttons	62

Quick Tips: Secrets To Succeeding At Common Tasks	64
Network Your Home Or Small Business	66
Network Planning	72
PC Security, Part III (Internet)	74
Breathe Life Into Old Files	78
Hardware Reviews	
Portable PCs: Fujitsu LifeBook 1440H	81
Printers: Lexmark 3770 Photo Jetprinter	82
Photo Printers: Polaroid ColorShot Digital Photo Printer	82
Storage: HotSwap Docking Module	83
Speakers: Altec Lansing ACS48 Speakers	83
Monitors: Diamond Pro 900u	84
CD-ROM Cops: DiscQuick Model 102	84
The Fine Print In Y2K	85
More Than Just A Search Engine (portal features)	90
Dare You Download?	94
Key Parts Of A Network	98

June

Windows 98: Using The Favorites Menu	13
Windows 98: Using My Briefcase	14
Windows NT: Fast Access Methods	15
Basic Training	
(accessibility options, using hotkeys, and using DriveSpace)	16
No More Waiting In Line (electronic postage)	20
PCs Get Smart (artificial intelligence)	24
Your Body, Your Security	26
Investing With E*TRADE	28
Scuba.com Makes The Trade	32
Web Tips: Ideas That Make The Most Of Online Time	36
Take Charge Of Your Portfolio	37
Free Access To The Internet	44
Can Printers' Consuming Costs	47
Getting Noticed By Search Engines	50
All For One & One For All (multifunction PDAs)	56
Quicken Deluxe 98: Setting Up A Budget, Part I	58
Microsoft Word: Creating Envelopes & Labels	59
HTML: Create Web Page Animations	60
Microsoft Word 97: Adding Borders & Shading	61
Lotus 1-2-3 97: Using General Statistical Functions	62
Microsoft Excel 97: Consolidating Worksheet Data	64
PowerPoint 97: Linking To Excel Charts	65
Print Shop Deluxe: Customizing A PressWriter QuickStart Layout	66
Web Browsers: Setting Up Netscape's NetWatch	67
Going Online: Building GeoCities Web Pages	68
WordPerfect: Merging Your Documents, Part 2	69
Quick Tips: Secrets To Succeeding At Common Tasks	70
PC Security, Part IV (businesses)	70
There's No Business Like Show Business (shopping at PC shows)	78

Hardware Reviews

Portable PCs: NEC MobilePro 770 Handheld PC	81
Sound Cards: Diamond Multimedia Monster MX300	82
Photo Printers: Olympus P-330 Digital Home Photo Printer	82
Printers: Hewlett-Packard Deskjet 420C	83
Monitors: Compaq TFT5000	83
Storage: Iomega ZIP Zip drive	84
Projectors: Toshiba TTY-GTU LCD Projector	84
Desktop Online Connection Speeds	85
Shorten Your Tins Online	88
Specialized Search Engines	91
Stay Informed, Stay Alert (E-mail alerts)	91
Online Queries	98

July

Windows 98: Using Desktop Themes	14
Windows 98: Find Files & Information Fast	15
Windows NT: Using Administrative Tools	16
Basic Training	
(putting applications at your fingertips, manage file attributes, easy backup/disasters, and operating system versions)	18
Your Own Personal Web Sleuths	22
Return To Your Old Reliable Configuration	22

Tune In To broadcast.com	30
Get Sold On eBay	34
Web Tips: Ideas That Make The Most Of Online Time	37
Browsers Built To Order	38
Make The Most Of Your Browser	42
Boosting E-mail Efficiency	46
PDAs: Are They For Everyone?	50
Microsoft Word 97: Adding Bullets & Numbering	52
Print Shop Deluxe: Using A Business Card	53
Web Browsers: Listening To The Radio With Internet Explorer 5.0	56
HTML: Maintaining Your Site To Encourage Visitors To Return	57
WordPerfect 8.0: Coming To Terms With Using	58
QuickCorrect Tools	58
Quicken Deluxe 98: Setting Up Reminders	59
Going Online:	
Manage Your Life With Yahoo! Calendar	60
Lotus 1-2-3 97: Opening And Paring Text Files	62
Microsoft Excel 97: Using The Scenario Manager	63
PowerPoint 97: Working With Macros	64
Works 4.5: Sharing Data Among Works Programs	65
Quick Tips: Secrets To Succeeding At Common Tasks	66
Maintenance Made Easy (batch files)	69
Pick Your Chip	74
Hardware Reviews	
Portable PCs: Fujitsu LifeBook E360	77
Digital Cameras: Canon PowerShot Pro 70	78
Video-Capture Cards: Pinnacle System Studio DC10plus	78
Storage: Sony SuperStation External Tape Drive	79
Printers: GGG Technologies Elite 12/600	79
Printers: Lexmark Z51 Color Jetprinter	80
Scanners: Hewlett-Packard CapShare 910	80
Troubleshooting: CPUs	82
Web Sites Get Personal	84
Cutting Through The Clutter	88
Easy Online Searching	94
How Caching Works	98

August

Windows 98: Using Windows Update	12
Windows 98: Channel Surfing With WebTV	13
Windows NT: Tape Backups	14
Basic Training	
(unusual keyboard keys, finding and accessing files, and deleting and unloading files)	16
End The Paper Trail (scannable archives)	20
Merging PCs & Phones	24
You've Got A Home At AOL.com	28
bankrate.com Solves Financial Mysteries	32
Web Tips: Ideas That Make The Most Of Online Time	36
Defending The Net (stopping spam)	37
Trashing Spam (anti-spam utilities)	40
Working At The Worldwide Office	42
Are You A Spammer?	46
Pagers Get More Power	48
WordPerfect 8.0: Using The Thesaurus	50
Lotus 1-2-3 Millennium Edition: A Look At The Latest Edition	51
PowerPoint 97: Printing Your Presentation	52
Web Browsers: Using Internet Explorer 5's What's Related	53
HTML: Fancy Fonts	56
Microsoft Excel 97: Putting Excel On Auto	57
Going Online: Find Yourself With The Internet	58
Microsoft Word 97: Multiple Sections	59
Quicken Deluxe 98: 5 Tips For Experienced Users	60
Print Shop Deluxe: Using Print Merge To Create Individualized Certificates	62
Microsoft Works 4.5: Doing A Mail Merge	63
Quick Tips: Secrets To Succeeding At Common Tasks	64
Focusing On Digital Cameras	66
Photo-User-Apps (photocopying)	71
Life With Linux	74
Is USB Now Connected With The "In Crowd"	78

Hardware Reviews

Desktop Systems: Macintosh iMac	82
---------------------------------	----

Remote Controls: Harman Kardou Take Control TC1000	83
Storage: Iomega Zip 250MB SCSI Drive	83
Portable PCs: Hitachi HPW-300E	84
Storage: Memorex CD-RW 4234	84
Inkjet Printers: Canon BJC-2000	85
Voice Records: Olympus V90 Digital Voice Recorder	85
Troubleshooting: Laser Printers	86
No Strings Attached (wireless connections)	92
Making Wars Online	98

September

Windows 98: Insights Into Outlook Express	12
Windows 98 Second Edition	14
Windows NT Service & Option Packs	16
Basic Training	
(copying files, cutting and pasting, changing desktop colors and designs, and removing fonts)	17
Broaden Your Horizons Online	22
Installing More Broadband Power	29
The Customer Service Barrier: Perception Or Reality?	32
More Than Just An Index (About.com)	34
Don't Hide Online: Go Seek (ICQ.com)	38
Web Tips: Ideas That Make The Most Of Online Time	42
All-Knowing Numbers (data tracking)	43
Readers & Viewers	46
Look Like A Pro, Part I: In Print	50
Smaller Yet Bigger (compact storage)	56
Microsoft Excel 97: Using File Properties	58
Quicken Deluxe 98: Using The Check Register	59
Going Online: Track Your Packages Online	60
Microsoft Word 97: Importing & Exporting Files From Other Word Processors	61
WordPerfect 8.0: Comparing And Reviewing Documents	62
Lotus 1-2-3 Millennium Edition: Sharing Data Between Applications	64
Print Shop Deluxe: Creating Custom Calendars	65
Web Browsers: Importing & Exporting Favorites	66
Microsoft Works 4.5: Using Headers And Footers	67
PowerPoint 97: Using The Slide Finder	68
HTML: JavaScript Popups	69
Quick Tips: Secrets To Succeeding At Common Tasks	70
Figuring Out FTP	72
Movie! On Up (installing Office 2000)	75
Hardware Reviews	
Portable PCs: Compaq Presario 1670	79
Audio: Diamond Multimedia Rio PMP 300	80
Inkjet Printers: Canon Zxi 11	81
Monitors: ViewSonic EP71	81
DVD Players: Creative Labs PC-DVD Encore 6X	81
Input Devices: GoldTouch Mouse	82
Laser Printers: Xerox DocuPrint NC60	82
Troubleshooting: Video Cards	84
This Is The Web On Broadband	88
Browse Carefully	93
The Ever-Shrinking World Of Computing	98

October

Treasure Hunting In Windows 98	12
Chat With Windows NT	14
Basic Training	
(changing COM port settings, using character mapping, and adding/setting up a printer)	16
Tunes For A Song (MP3)	20
PC Conversations: E-commerce	22
Stake A Claim On GeoCities	26
Make The Move To REALTOR.COM	30
Web Tips: Ideas That Make The Most Of Online Time	34
Faxing Hits The Internet	35
DOS Skills For A Windows World	37
Binding Up Electronic Paperwork	40
Look Like A Pro, Part II: On The Web	48
Open A Print Anytime, Anywhere	52
Quicken Deluxe 98: Financial Planning, Part I	54
Print Shop Deluxe: Installing & Working With Fonts	56
Web Browsers: Using Internet Explorer's Links Bar	57

HTML: Using Lists	58
Lotus 1-2-3 Millennium Edition: Working With Ranges	59
Going Online: Translate Foreign Languages	60
Microsoft Word 4.5: Personalizing Your Workspace	62
Microsoft Word 97: Using The Picture Toolbar	63
WordPerfect 8.0: Configure The Menu Bar	64
Microsoft Excel 97: Customizing Excel's Menus	65
PowerPoint 97: Sharing Information With Word	66
Quick Tips: Secrets To Succeeding At Common Tasks	68
Create A Private Network Across The Internet	70
DVD-ROM Drive	74

Hardware Reviews

Desktop Systems: Dell Dimension XPS T550	78
Modems: MultiTech MultiModem USB	79
Audio: SoundScene TRUE512/SOUND	79
Input Devices: Genius NetScroll	80
Digital Cameras: Canon ELura	80
Storage: Iomega Click!	81
Monitors: Current Leaders	81
IRQ Conflicts	82
Stay Off The Swindlers' List (online scams)	87
Stop Safely Online	92
Registering A Domain Name	98

November

Windows 98: My Computer vs. Explorer	12
Windows 98: Customize Your Desktop	14
The Many Flavors Of Windows NT	15
Basic Training (Windows graphics programs, CTRL-ALT-DEL, built-in online tools, changing keyboard settings)	16
Microsoft Alternatives	20
Do-It-Yourself Customer Service	26
Top Off Your Television	30
The Web: Bank On It	32
IRQ Conversations: Online Learning	36
You're In Good Hands: With Insurance.com	40
Monster.com Has A Job For You	44
Web Tips: Ideas That Make The Most Of Online Time	47
Dealing With Desktop Icons	48
Serve Your Own Web Site	50
Unlikely Underdog (Windows CE vs. Palm)	56

Listed By Department

PC Operating Instructions

DOS: Built-In Virus Protection	January 14
Windows: Working With .INI Files	January 15
Windows 95/98: The Windows Registry	January 17
Windows 98: The New & Improved Startup Diskette	January 19
DOS: Avoiding Common DOS Mistakes	February 14
Windows 3.1: Improve Performance With SmartDrive	February 15
Windows 95: Communication Tools	February 16
Windows 95: Exploring My Computer Options	February 17
Windows 98: Check Your Registry	February 18
Windows 98: A View To A File	February 19
Windows 98: System Information Tools	March 14
Windows 98: Year 2000 Update	March 15
Windows 98: Maintenance Wizard Optimizes Performance	April 14
Windows 98: Version Conflict Manager	April 15
Windows 98: Quick Launch Toolbar	May 14
Windows 98: Using Network Neighborhood	May 15
Windows 98: Using The Favorites Menu	June 13
Windows 98: Using My Briefcase	June 14
Windows NT: Fast Access Methods	June 15
Windows 98: Using Desktop Themes	July 14
Windows 98: Find Files & Information Fast	July 15
Windows NT: Using Administrative Tools	August 16
Windows 98: Using Windows Update	August 17
Windows 98: Channel Surfing With WebTV	August 18
Windows NT: Tape Backups	August 14
Windows 98: Insights Into Outlook Express	September 12
Windows 98 Second Edition	September 14
Windows NT Service & Option Packs	September 16
Treasure Hunting In Windows 98	October 12
Chat With Windows NT	October 14
Windows 98: My Computer vs. Explorer	November 12

PowerPoint 97: Using The AutoContent Wizard	58
Going Online: Using AOL Buddy List	59
Microsoft Word 4.5: Working With Clip Art	60
Microsoft Word 97: Protect Documents From Macro Viruses	63
WordPerfect 8.0: Changing Tab Settings	64
Quickend Deluxe 98: Financial Planning, Part II	65
Print Shop Deluxe: Creating Mailing Labels	66
Web Browsers: Composing Messages In Outlook Express 5	67
HTML: The Magic Of Meta Tags	68
Lotus 1-2-3 Millennium Edition: Creating Versions For What-If Analysis	69
Microsoft Excel 97: Creating & Using Hyperlinks	70
Quick Tips: Secrets To Succeeding At Common Tasks	72
The Free-Second Commute (telecommuting)	74
The Great PC Giveaway	78

Hardware Reviews

Portable PCs: Sony VAIO C1X Picturebook	83
Monitors: Mitsubishi LCD 80	84
Audio: AC3 54 PowerPlay Plus	84
Storage: IBM Deskstar 37GP	85
Portable PCs: Palm IIIe	85
Scanners: Agfa SnapScan Touch	86
Desktop Systems: Current Leaders	86
Quest For The Crash-Proof Operating System	88
Designing A Usable Web Interface	92
The Latest Edition	98

December

Windows 98: System Configuration Utility	12
Windows 98: How To Compress Drives	14
Windows NT: NT's Little Black Box (Event Viewer)	15
Basic Training (customizing mouse settings, adding password protection, using the PRINT SCREEN key)	16
State Of The PC (industry report)	20
Desktop PCs	21
Notebooks PCs	23
PDAs	24
Operating Systems	25
Software	26

Processors	28
Monitors	29
Removable Storage	30
Hard Drives	31
Modems	32
Input Devices	34
Sound & Video	35
Printers	37
Digital Cameras	38
Scanners	39
PC Conversations: The Year 2000 Problem	40
Amazon.com's Tributaries	44
Rest Your Feet At Shopping.com	47
Web Tips: Ideas That Make The Most Of Online Time	50
Creating The Web Printing Woes	52
Contact Management	54
Microsoft Word 97: Common Shortcut Keytrotters	60
WordPerfect 9.0: An Overview Of What's New	61
Lotus 1-2-3 Millennium Edition: Using View Menu Options	62
Going Online: Watch & Listen With RealPlayer G2	63
Microsoft Excel 97: Using Range Names	64
Web Browsers: Browsing Offline With Internet Explorer 5	66
Quickend Deluxe 99: Online Banking	67
PowerPoint 97: Using The Picture Toolbar	68
Print Shop Deluxe: Working With Graphics In PressWriter	69
Microsoft Word 4.5: Create & Use Charts	70
Quick Tips: Secrets For Succeeding At Common Tasks	72
Programming From Ground Zero	74
Is It Time For A Laser Printer In Your Life?	78

Hardware Reviews

Desktop Systems: Compaq Presario 5714	80
Networking: Ethernet Networking Starter Kit	81
Video Cards: Winmodem Video AV	81
Monitors: Princeton Ultra S2B Monitor	82
Storage: Imation SuperDisk IDE Drive	82
Printers: Brother HL-1240	83
CD/DVD Drives: Current Leaders	83
Working Around The Bombs (software failures)	84
How Far We've Come	90

Windows 98: Customize Your Desktop	November 14
The Many Flavors Of Windows NT	November 15
Windows 98: System Configuration Utility	December 12
Windows 98: How To Compress Drives	December 14
Windows NT: NT's Little Black Box (Event Viewer)	December 15
Basic Training (changing refresh rates, using Compare in backup tools, deleting font files)	January 21
(understanding and editing program information files, exploring files and directories)	February 20
(deleting programs, creating file associations, adding startup programs, removing startup programs, adjusting date and time)	March 16
(setting up screen savers, defragmenting your hard drive, checking physical memory, moving files)	April 16
(installing and updating device drivers, changing Desktop icons, mastering sound files)	May 16
(accessibility options, using hotkeys, and using DriveSpace)	June 16
(putting applications at your fingertips, manage file attributes, easy backup diskettes, and operating system versions)	July 18
(unusual keyboard keys, finding and accessing files, and deleting and undeleting files)	August 16
(copying files, cutting and pasting, changing desktop colors and designs, and removing fonts)	September 17
(Changing COM port settings, using character mapping, and adding/setting up a printer)	October 16
(Windows graphics programs, CTRL-ALT-DEL, built-in online tools, changing keyboard settings)	November 16
(customizing mouse settings, adding password protection, using the PRINT SCREEN key)	December 16

Windows Computing

Windows Family Stat Sheet	January 26
Which Windows Is For You?	January 30
Windows To The Future	January 33
Word Processing Power Tools	January 36

Quicken Vs. Money	February 24
1040s Made Simple (tax software)	February 28
Publisher Picks (desktop publishing)	March 20
Performance Optimization	April 20
Ar Bugs For Your PC (anti-crash utilities)	April 24

General Computing

When Rebates Go Bad	January 40
A File Format For Everyone (Adobe Acrobat)	January 42
Distance Education	January 44
What's Hot, What's Not	February 32
Online Banking	February 38
Mission-Critical Countdown (Y2K)	March 26
Save Your Software From Y2K	March 30
Help For The Journey To Y2K (utilities & Web sites)	March 36
Surviving Hardware Market Shakeup	March 39
Spare-Time Solutions	April 26
Books Embrace The Internet	April 30
Don't Leave Home Without Them (travel agents vs. the Web)	May 20
All About the World Wide Web! (travel sites)	May 24
Your Wallet Gets Smarter (Smart Cards)	May 30
No More Waiting In Line (electronic postage)	June 20
PCs Get Smart (artificial intelligence)	June 24
Your Body, Your Security	July 22
Your Own Personal Web Sleuth	July 26
Return To Your Old Reliable Configuration	August 20
End The Paper Trail (scannable archives)	August 24
Merging PCs & Phones	September 22
Broaden Your Horizons Online	September 29
Installing More Broadband Power	September 22
The Customer Service Barrier: Perception Or Reality?	October 20
Tunes For A Song (MP3)	November 20
Microsoft Alternatives	November 26
Do-It-Yourself Customer Service	November 30
Top Off Your Television	December 20
State Of The PC (industry report)	December 21
Desktop PCs	December 23
Notebook PCs	December 23
PDAs	December 23
Operating Systems	December 25
Software	December 26
Processors	December 28
Monitors	December 29
Removable Storage	December 30
Hard Drives	December 31
Modems	December 32
Input Devices	December 34
Sound & Video	December 35
Printers	December 37
Digital Camera	December 38
Scanners	December 39

PC Conversations

E-commerce	October 22
Online Learning	November 36
The Year 2000 Problem	December 40

Master The Web

Travelocity Takes Off	May 32
American Airlines Gets Personal	May 35
Web Tips: Ideas That Make The Most Of Online Time	May 40
Investing With E*TRADE	June 28
Schwab.com Makes The Trade	June 32
Web Tips: Ideas That Make The Most Of Online Time	June 36
Tune In To Broadcast.com	July 30
Get Sold On eBay	July 34
Web Tips: Ideas That Make The Most Of Online Time	July 37
You've Got A Home At AOL.com	August 28
bankrate.com Solves Financial Mysteries	August 32
Web Tips: Ideas That Make The Most Of Online Time	August 36
More Than Just An Index (About.com)	September 34
Don't Hide Online: Go Seek (ICQ.com)	September 38
Web Tips: Ideas That Make The Most Of Online Time	September 42
Stake A Claim At GeoCities	October 26
Make The Move To REALTOR.COM	October 30
Web Tips: Ideas That Make The Most Of Online Time	October 34
You're In Good Hands With Insure.com	November 40

Monster.com Has A Job For You	November 44
Web Tips: Ideas That Make The Most Of Online Time	November 47
American's Tributes	December 44
Rest Your Feet At Shopping.com	December 47
Web Tips: Ideas That Make The Most Of Online Time	December 50

Computing Basics

Take It To The Limit (software system requirements)	January 49
Build To Order (ordering PCs)	February 42
Maintain A Clean Machine	February 44
The Little Diskette That Couldn't	March 42
What Works Where? (reading system requirements)	March 45
Finding Computer Bottlenecks	April 32
Click The Right Way	April 38
Microsoft's Online Support	May 41
Take Charge Of Your Portfolio	June 37
Free Access To The Internet	June 44
Cut Printers' Consuming Costs	June 47
Browsers Built To Order	July 38
Make The Most Of Your Browser	July 42
Defending The 'Net (stopping spam)	August 37
Trashing Spam (anti-spam utilities)	August 40
All-Knowing Numbers (data tracking)	September 43
Readers & Viewers	September 46
Faxing Hits The Internet	October 35
DOS Skills For A Windows World	October 37
Dealing With Desktop Icons	November 48
Curing The Web Printing Woes	December 52

Office Computing

Uncovering Microsoft Office's ValuePack	January 51
Read E-mail From The Road	January 54
Intro To E-commerce	February 46
Must-Have Mobile Utilities	February 52
Compound Documents	March 47
Office 2000: The Parts	April 40
Office 2000: The Parts (continued)	April 46
Speed Through The Road (portable PC tips)	April 52
Using Kits To Build Networks	May 43
Best Of Both Worlds (portable PCs at the desk)	May 47
Getting Noticed By Search Engines	June 50
All For One & One For All (multifunction PDAs)	June 56
Routing E-mail Efficiently	July 46
PDAs: Are They For Everyone?	July 50
Working At The Worldwide Office	August 42
Are You A Spammer?	August 46
Pagers Get More Power	August 48
Look Like A Pro, Part I: In Print	September 50
Smaller Yet Bigger (compact storage)	September 56
Binding Up Electronic Paperwork	October 40
Look Like A Pro, Part II: On The Web	October 44
Decision-Analysis Software	October 48
Open & Print Anytime, Anywhere	October 52
Serve Your Own Web Site	November 50
Unlikely Underdog (Windows CE vs. Palm)	November 56
Contact Management	December 56

Quick Studies

Microsoft Word 97	January 64
Writing In Foreign Languages	January 64
Microsoft Photo Editor	February 64
Working With Captions	March 56
Editing Web Templates	April 56
Adding Sound To Your Web Page	May 56
Adding Borders & Shading	June 61
Adding Bullets & Numbering	July 52
Multiple Sections	August 59
Importing & Exporting Files From Other Word Processors	September 61
Using The Picture Toolbar	October 63
Protect Documents From Macro Viruses	November 63
Common Shortcuts/Keystrokes	December 60

WordPerfect 8

An Overview Of What's New	January 56
Working With TextArt	February 56
Using Mail Merge Documents	March 53
Sorting Text	April 59

Merging Your Documents, Part I	May 57
Merging Your Documents, Part 2	June 59
Coming To Terms With Using QuickCorrect Tools	July 58
Using The Thesaurus	August 50
Comparing And Reviewing Documents	September 62
Configure The Menu Bar	October 64
Changing Tab Settings	November 64

WordPerfect 9.0	
An Overview Of What's New	December 61

Microsoft Excel 97	
Protecting Your Data Part II	January 66
Using Autofilter	February 59
Using Chart Types	March 54
Automating Tasks With Macros	April 65
Attaching Macros To Buttons	May 62
Consolidating Worksheet Data	June 64
Using The Scenario Manager	July 63
Putting Excel On Auto	August 57
Using File Properties	September 58
Customizing Excel's Menus	October 65
Creating & Using Hyperlinks	November 70
Using Range Names	December 64

Lotus 1-2-3 97	
What's New For Upgraders	January 57
Changing The Worksheet Display	February 60
Summarize Data With Outlines	March 59
Linking Data To Geographic Maps	April 60
Setting sheet Properties	May 58
Using General Statistical Functions	June 62
Opening And Parsing Text Files	July 62

Lotus 1-2-3 Millennium Edition	
A Look At The Latest Edition	August 51
Sharing Data Between Applications	September 64
Working With Ranges	October 59
Creating Versions For What-If Analysis	November 69
Using View Menu Options	December 62

Quicken Deluxe 98	
Introducing Quicken Deluxe 98	January 58
10 Starter Tips	February 54
Using Quicken In A Small Business, Part I	March 60
Using Quicken In A Small Business, Part II	April 66
Setting Up A Budget, Part I	May 49
Setting Up A Budget, Part II	June 58
Setting Up Reminders	July 59
5 Tips For Experienced Users	August 60
Using The Check Register	September 59
Financial Planning, Part I	October 54
Financial Planning, Part II	November 65

Quicken Deluxe 99	
Online Banking	December 67

PowerPoint 97	
Saving Presentations For Web Use	January 67
Summarizing Your Slides	February 61
10 Tips For Effective Toolbars	March 51
Jazz Up Presentations With Animation Effects	April 62
Creating & Modifying Tables	May 60
Linking To Excel Charts	June 65
Working With Macros	July 64
Printing Your Presentation	August 52
Using The Slide Finder	September 68
Sharing Information With Word	October 66
Using The AutoContent Wizard	November 58
Using The Picture Toolbar	December 68

Print Shop 6.0 Deluxe	
Introduction To A New Version	January 61
Photo Enhancements & Special Effects	February 62
Creating Pages For The Web	March 61
Importing & Organizing Digital Photos	April 63
Preparing Images For The Web With Photo Organizer	May 61
Customizing A PressWriter QuickStart Layout	June 66

Designing A Business Card	July 53
Using Print Merge To Create Individualized Certificates	August 62
Creating Custom Calendars	September 65
Installing & Working With Fonts	October 56
Creating Mailing Labels	November 66
Working With Graphics In PressWriter	December 69

Web Browsers	
Updating Internet Explorer Components	January 65
Internet Explorer 4.0's Explorer Bar	February 55
Browsing Faster In Netscape	March 52
Set Up Multiple Outlook Express 5 Users	April 64
Search With Internet Explorer 5.025	May 50
Listening To The Radio With Internet Explorer 5.0	June 67
Using Internet Explorer 5's What's Related Tool	July 56
Importing & Exporting Favorites	August 53
Using Internet Explorer's Links Bar	September 66
Composing Messages In Outlook Express 5	October 57
Browsing Offline With Internet Explorer 5	November 67

Going Online	
Ins & Outs Of HTML E-mail	January 62
Reigning In The Palace	February 63
Finding Official Tax Forms	March 56
Check External Accounts With Web E-mail	April 57
Checking AOL's NetMail	May 51
Building GeoCities Web Pages	June 68
Manage Your Life With Yahoo! Calendar	July 60
Find Yourself With The Internet	August 58
Track Your Packages Online	September 60
Translate Foreign Languages	October 60
Using AOL Buddy List	November 59
Watch & Listen With RealPlayer G2	December 63

Microsoft Works 4.5	
Upgrading To 4.5	January 63
Using Formulas In A Spreadsheet	February 67
Download Graphics & Templates	March 58
Creating User-Friendly Spreadsheets	April 67
Converting Files	May 52
Creating Envelopes & Labels	June 59
Sharing Data Among Workbooks	July 65
Doing A Mail Merge	August 63
Using Headers And Footers	September 67
Personalizing Your Workspace	October 62
Working With Clip Art	November 60
Create & Use Charts	December 70

HTML	
Framing Your Page	January 68
Common Web Design Mistakes	February 58
Cascading Style Sheets	March 62
Choosing Web Graphics	April 58
Ideas For Creating A Great Web Site	May 53
Create Web Page Animations	June 60
Maintaining Your Site To Encourage Visitors To Return	July 57
Fancy Fonts	August 56
JavaScript Popups	September 69
Using Lists	October 58
The Magic Of Meta Tags	November 68

Beyond The Basics

Team Up On Documents	January 72
Multimedia Authoring	February 70
PC Security, Part I (standalone PCs)	March 66
PC Security, Part II (viruses)	April 70
Speed Up Startups	May 64
Network Your Home Or Small Business	June 66
Network Planning	July 72
PC Security, Part III (Internet)	August 74
PC Security, Part IV (businesses)	September 73
Maintenance Made Easy (batch files)	October 69
Focusing On Digital Cameras	November 66
Photo Filter Upgraders (photoediting)	December 71
Life With Links	January 71
Figuring Out FTP	February 72
Create A Private Network Across The Internet	March 70

The Five-Second Commute (telecommuting) November 74
Programming From Ground Zero December 74

Upgrading

Processors January 77
RAM February 74
Prepare Your Hardware For Y2K March 70
Monitors April 76
Breathe Life Into Old Files May 78
There's No Business Like Show Business (shopping at PC shows) June 78
Pick Your Chip July 74
Is USB Now Connected With The "In" Crowd? August 78
Movin' On (installing Office 2000) September 75
DVD-ROM Drive October 74
The Great PC Giveaway November 78
Is It Time For A Laser Printer In Your Life? December 78

Hardware Reviews

Mobile Computers: NEC Versa LX January 83
Modems: Viking 56kbps External Modem January 84
Video Cameras: PC Video Mail January 84
Input Devices: Panko Drilling Tablet January 85
Video Cameras: Kodak DVC323 January 85
Monitors: F110 21-inch Trinitron January 86
Digital Cameras: QV-7000SX January 86
Desktop Systems: Rio 7100 February 78
Pointing Devices: Remote Combo Pak February 79
Digital Cameras: DC210 Plus February 79
Monitors: VS-E15 February 80
Portable Computers: TinyNote 2007NS-01 February 80
Modems: V-90 56K Voice Faxmodem Pro February 81
Speakers: Monsoon MM-1000 Multimedia Speaker System February 81
Portable PCs: Gateway Solo 3100XL March 75
Input Devices: Logitech NewTouch Keyboard March 76
Monitors: EIZO Color L60 March 76
Scanners: Microtek ImageDesk March 76
Scanners: IBM IdeaScan March 77
Video Cards: Creative Labs 3D Blaster Banshee March 78
Printers: Canon BJC-5000 March 78
Desktop Systems: Compaq Presario 5050 April 79
PC Telephony: Microsoft MP-900 Cordless PC Phone System April 80
Monitors: Princeton DDP 500 Flat-Panel Display April 80
Multifunction Devices: Hewlett-Packard Office Jet Pro 1175C April 81
Speakers: Benzin BW2000 Speakers April 81
Inkjet Printers: Epson Stylus 740 April 82
Audio: E.W. Bridge Pocket RadioMate 400 April 82
Portable PCs: Fujitsu Lifebook L4010 May 81
Printers: Lexmark 5700 Color Jetprinter May 82
Photo Printers: Polaroid ColorShot Digital Photo Printer May 82
Storage: HotSwap Docking Module May 83
Speakers: Altex Lansing ACS48 Speakers May 83
Monitors: Diamond Pro 900a May 84
CD-ROM Copiers: DiscQuik Model 102 May 84
Portable PCs: NEC MobilePro 770 Handheld PC June 81
Sound Cards: Diamond Multimedia Monster MX300 June 82
Photo Printers: Olympus P-330 Digital Home Photo Printer June 82
Printers: Hewlett-Packard Deskjet 420C June 83
Storage: Iomega USB Zip Drive June 83
Projectors: Toshiba TY-GTU LCD Projector June 84
Portable PCs: Fujitsu Lifebook E660 July 77
Digital Cameras: Canon PowerShot Pro 70 July 78
Video Capture Cards: Pinnacle System Studio DC10plus July 78
Printers: Sony SuperStation External Tape Drive July 79
Printers: GCC Technologies Elite 12/660 July 79
Printers: Lexmark Z51 Color Jetprinter July 80
Scanners: Hewlett-Packard CapScape 910 July 80
Desktop Systems: Macintosh iMac August 82
Remote Control: Harman Kardian Tape Control TK1000 August 83
Storage: Iomega Zip 250MD SCSI Drive August 83
Portable PCs: Hitachi HPW-2003C August 84
Storage: Memorex CD-RW 4224 August 84
Inkjet Printers: Canon BJC-2000 August 85
Voice Recorders: Olympus V90 Digital Voice Recorder August 85
Portable PCs: Compaq Presario 1670 September 79
Audio: Diamond Multimedia Rio PMP 300 September 80
Inkjet Printers: Lexmark Z11 September 80
Monitors: ViewSonic E771 September 81

DVD Players: Creative Labs PC-DVD Encore 6X September 81
Input Devices: ColdTouch Mouse September 82
Laser Printers: Xerox DocuPrint N600 September 82
Desktop Systems: Dell Dimension XPS T550 October 78
Modems: MultiTech MultiMobileUSB October 79
Audio: SoundSource TRUESound October 79
Input Devices: Genius NetScroll October 79
Digital Cameras: Canon Elura October 80
Storage: Iomega Clik! October 81
Monitors: Current Leaders October 81
Portable PCs: Sony VAIO C1X PictureBook November 83
Monitors: Mitsubishi LCD 80 November 84
Audio: ACS 3A PowerPlay Plus November 84
Storage: IBM Deskstar 3760 November 85
Portable PCs: Palm III November 85
Scanners: Agfa SnapScan Touch November 86
Desktop Systems: Current Leaders November 86
Desktop Systems: Compaq Presario 5714 December 80
Networking: Ethernet Networking Starter Kit December 81
Video Cards: WinVid Network AV December 81
Monitors: Princeton Ultra 52B December 82
Storage: Imation SuperDisk IDE Drive December 82
Printers: Brother HL-1240 December 83
CD/DVD Drives: Current Leaders December 83

Troubleshooting

Decipher Common Error Messages January 87
Save Data From Dying Drives February 82
Inkjet Printers March 80
World Wide Web Sites April 84
The Fine Print In Y2K May 85
Decipher Connection Speeds June 85
CPUs July 82
Laser Printers August 86
Video Cards September 84
IRQ Conflicts October 82
Quest For The Crash-Proof Operating System November 88
Working Around The Bombs (software failures) December 84


Plugged In

Organize Your Bookmarks January 91
Expand Your Web Search January 93
Online Investing Resources February 86
Standardize Your Modem With V.90 February 91
Upgrading To AOL 4.0 February 93
The "Net's Legal Pitfalls" March 85
Make The Switch (changing ISPs) March 90
Web-Based Calendars March 94
Rev Up Your "Net Connection" April 87
Timing Web Sites April 92
More Than Just A Search Engine (portal features) May 90
Date You Download! May 94
Shorten Your Time Online June 88
Specialized Search Engines June 91
Stay Informed, Stay Alert (E-mail alerts) June 93
Web Sites Get Personal July 84
Cutting Through The Clutter July 88
No Online Searching July 94
No Strings Attached (wireless connections) August 92
This Is The Web On Broadband September 90
Browse Carefully September 93
Stay Off The Swindler's List (online scams) October 87
Shop Safely Online October 92
Designing A Usable Web Interface November 92

Tidbits

Computer Anatomy, Part I January 98
Computer Anatomy, Part II February 98
Choose Your Format (Save As options) March 98
Have Windows Your Way (customizing the Desktop) April 98
Key Parts Of A Network May 98
Online Queries June 98
How Caching Works July 98
Making Waves Online August 98
The Ever-Shrinking World Of Computing September 98
Registering A Domain Name October 98
The Latest Edition November 98
How Far We've Come December 90

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When you need help resolving computer-service problems, bring your questions to Action Editor.

Dell Delivers



The CD-ROM Drive on my Dell 486 system quit working in July. I called Dell Technical Support and after some time on the phone, a Dell representative told me someone would contact me for an on-site repair. The repair did get scheduled and a new sound card and CD-ROM drive were shipped. While attempting to install the new drive, however, the technician found the sound card was incompatible with my system. After some time on the phone with Dell, another delivery was arranged. Once again, the wrong card was shipped. Since then, the ship date has slipped several times. I now have no ship date and no idea when Dell will make good on the 48-hour extended warranty I purchased.

GEORGE SCHOENFELD
KEMPNET, TX

We contacted Lynn Neille, senior communications manager for Dell Services, and she put us in touch with Linda Kelly, a customer service and support representative at Dell. Linda told us that because the computer was more than four years old, Dell had trouble arranging for the proper parts to be shipped. As a result, the ship dates continued to slip. Because of the delay, Dell offered George a 10% discount on any new Dell system and promised that it would fix his old system when the parts arrived. George accepted the offer and purchased a Celeron system. When it was clear the parts weren't unavailable for George's old PC, Dell went out of its way to offer George a new Pentium III 450 megahertz (MHz) system in exchange for his old 486. George accepted the offer.



After I purchased an Olympus D320L camera, I contacted Olympus to sort out a software conflict with the camera. During the call, I asked about the flash path adapter. The technician said they were great and that Olympus was giving them away. He gave me the Web address of the form I needed to fill out to receive one. I still haven't received my new adapter. The only response I received stated that there are back-order problems and no exact ship date. Can you help?

DAVE SMITH
DOMINGUEZ HILLS, CA

We sent an inquiry to Olympus through its Web site and eventually received a reply that asked Dave to call Olympus at (800) 622-6327 and provide his contact information. The message did mention that Dave should call rather than reply via e-mail because the high volume of messages the company receives makes it difficult to respond promptly (it took a few weeks for an Olympus representative to respond to our original message). After calling Olympus and faxing his information to the company, Dave finally received his flash adapter.



Update:

Our August 1999 Action Editor reported on our dealings with CTX on behalf of Richard and Pat Fuller. They were experiencing delays in receiving a new, upgraded system to replace the faulty one they purchased. CTX cited difficulty in assigning a serial number to the PC as the reason for the delay.

After our August issue went to press, the Fullers received a new system from CTX. Although the system worked properly, it was missing 64 megabytes (MB) of RAM, had no serial number, and had no empty Industry Standard Architecture (ISA) slot. (NOTE: The Fullers made it clear to CTX that they needed a free ISA slot for their scanner's Small Computer System Interface [SCSI] card.) Eventually, the Fullers received a serial number and the RAM, but they again experienced slow service from CTX; it took three months for CTX to ship the RAM.

We contacted James Mills at the CTX Correspondence Bureau to ask about options for freeing up an ISA port. CTX offered a Peripheral Component Interconnect (PCI) modem to replace the ISA modem, but the Fullers had already attempted to install a PCI modem and met with conflicts they couldn't resolve. Not wanting to wait for CTX, the Fullers bought a new scanner that didn't require the ISA slot. Mills said he would inquire about a reimbursement from CTX for the scanner but later told us he was denied approval to submit the claim. The Fullers, however, intend to submit a claim for reimbursement.

Although the Fullers have a working PC, they have spent more than 20 months and more than \$100 on this dispute, which is still not resolved. ■

Are you having trouble finding a product or getting adequate service from a manufacturer? If so, we want to help solve your problem. Send us a description of the product you're seeking or the problem you had with customer service. In billing disputes, include relevant information (such as account numbers or screen names for online services) and photocopies of checks. Include your phone number in case we need to contact you. Letters may be edited for length and clarity; volume prohibits individual reply. Write to: Action Editor, PO Box 85380, Lincoln, NE 68501-5380. Or Send E-mail to editor@smartcomputing.com. Or fax us at (402) 479-2104.

56.6Kbps modem—A modem that transfers data at speeds of up to 56.6 kilobits per second, which currently is the fastest modem speed.

cache—(Pronounced CASH.) A bank of high-speed memory set aside for frequently accessed data. The term "caching" is used to describe placing data in the cache. Memory caching and disk caching are the two common methods used by PCs. Whenever data is accessed from or committed to main memory, a copy, along with the address, is saved in the cache along with the associated main memory address. A memory cache maintains a list of frequently accessed data, complete with the address of that data. When the processor attempts to access an address, the cache checks its stores. If the memory cache holds the requested address (called a cache hit), it returns the data to the processor. If it doesn't (called a cache miss), a traditional memory access takes place. Disk caching works essentially the same way but uses conventional main memory instead of high-speed memory. Many microprocessors today have built-in memory caches, which are called primary or Level 1 (L1) caches. External cache memory also can be added, called secondary or Level 2 (L2) caches.

CD-rewriteable (CD-RW)—A CD format that allows the CD to be erased and reused. CD-RWs are said to have 10-year lifespans and can be overwritten 10,000 times. CD-RW drives can play and write to discs and retrieve information from CD-ROMs. The technology was unveiled in 1995 after collaboration among 10 companies (including IBM, Philips, Sony, and Hewlett-Packard), and drives were made available in the spring of 1997.

dynamic-link library (DLL)—An executable subroutine stored as a file

separate from the programs that may use it. DLLs, which allow for the efficient use of memory because they are loaded into memory only when needed, are used extensively in Windows and OS/2. The DLL file name extensions are .DLL, .DRV, and .FON.

FireWire (IEEE-1394)—A specification for a new, high-speed external bus used to connect computer peripherals. The cost to use this bus is prohibitive for all but those peripherals that demand high external bus speeds for bandwidth-consuming multimedia, such as digital cameras, digital VCRs, and Digital Video Disc (DVD) players. For other external bus devices, such as mice and keyboards, the Universal Serial Bus (USB) is more economical even though it operates at a lower speed. IEEE 1394, developed at Apple Computers and dubbed FireWire, boasts transfer speeds of up to 400 megabits per second (Mbps) and can handle up to 63 devices. Other benefits include Plug and Play, hot-swapping, and support for a constant transmission speed, which is appropriate for streaming audio and video content because it doesn't handle changes in speed well. Though developed at Apple, the technology works on Macintosh and Windows computers.

Graphics Device Interface (GDI)—The graphics display component of Windows and Windows 95 operating systems. The GDI allows applications to display and print on output devices such as monitors and printers.

Open Database Connectivity (ODBC)—A standard for transferring data between two databases. The standard is especially helpful for transferring data between two databases written with two programs, such as dBASE and FoxPro or Microsoft Excel and Access. Both programs must support ODBC for the

transfer to work, however. ODBC works by putting a driver between the programs that access databases and the databases themselves. When one program wants to access a database created by another program, it accesses the driver for that database. The driver retrieves the data and passes it back to the first program.

PC Card—A credit card-sized device that plugs into a PC Card slot and enables the user to add additional computer peripherals including modems, sound cards, and CD-ROM drives. They are used primarily in portable computers but can be used in desktop systems as well. There are three sizes of PC Cards: Type I cards (3.3mm thick) often are used for adding RAM and ROM; Type II cards (5mm thick) usually are used for adding modems; and Type III cards (10.5mm thick) are sometimes used for adding a portable disk drive. Developed by the Personal Computer Memory Card International Association (PCMCIA), PC Cards were originally called PCMCIA cards.

virtual device driver (VxD)—Virtual device drivers act as a simulation buffer between applications and hardware. The drivers sort out and ensure that the correct application gets the information. With this setup, multiple applications can access the same hardware without causing conflict. In a device file name, V means virtual and D means device. The middle character(s) further define the device driver; for example, VmD represents a mouse driver. In Windows' System.ini file, there is a section called [386Enh], in which references to these drivers can be found. If the driver referenced is in another file, it will have a .386 file name extension (such as "Device=vmd.386"); if it is part of the Windows Enhanced mode kernel, the .386 extension is replaced with an asterisk (as in "Device=*vmd").

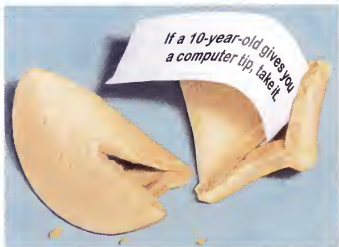
The Little PC Instruction Book

Insights & Random Wisdom From 1999

MAGAZINE PUBLISHING PLAYS tricks with the calendar, such as bringing the end of the publishing year before the NFL season even starts in earnest. Even if the last issue of the year goes to press in October instead of December, however, the year's final issue brings the chance to glance back at the wide range of stories we've covered in the last 12 months. It's also a chance to clean out the e-mail, notebooks, and random reminder notes in order to

make way for the next round. Some of the quick points we ran across in the last few weeks were too good to pass unnoticed, so we've provided the following collection of golden nuggets as bonus side notes to the stories you've read in 1999—no extra charge.

- Never underestimate how large a difference the correct mouse, keyboard, and monitor can make in your daily life.
- Treat clip art, fonts, and animated Web page elements like Tabasco sauce and use a dash to spice things up; few people have the stomach for more than that.
- Don't forget that many Silicon Valley gazillionaires are actually worth their net worth. When you're looking for a company to trust by investing or purchasing products, look for legitimate geniuses such as Gordon Moore, co-founder of Intel. Moore's Law has held up for more than 30 years in a business that foils predictions like day trading foils financial planning.
- You can find anything you want to know somewhere on the Internet as long as you can ask a search engine the right questions.
- If you insist on factoring a manufacturer's rebate into your buying decision, adjust your expectations by assuming you have a 50/50 chance of actually receiving the rebate.
- The newer the software, the higher the maintenance. Stay tuned to company Web sites to make sure you have the latest fixes for their products.
- Make a priority of learning to shut off any cartoony on-screen tutors that come with software. Bob and Office



Assistants may be the real reason so many people loathe Microsoft.

- Smart comparison shopping on inkjet printers includes pricing replacement ink cartridges.
- The Age Of Linux Innocence is over. The operating system has grown popular enough that real dollars are at stake in the Linux market. Geeks everywhere are already pining for the era of altruistic programmers improving the

free operating system.

- Always read the manual. It saves you headaches putting the birthday tricycle together, and it will save you many calls to technical support.
- A computer owner who refuses to use the Internet is like a car owner who refuses to travel more than five miles from home.
- Gamers and graphic artists should go for the hottest PC on the block. Everybody else gets all the power they need with much lesser machines.
- Ninety percent of handheld PC owners use the devices solely as status symbols, and the other 10% are much busier and better traveled than most of us will ever be.
- Ergonomic tips are as exciting as elementary-school posture lessons, but they're worth your attention.
- Apple's groovy iMac has forever changed the way computers will look.
- Even the iMac isn't groovy enough to change the fact that diskette drives are still the workhorses of data storage and transfer.
- Taking one introductory programming course can forever improve both your PC usage and your approach to general problem-solving.
- When someone accuses you of illegally copying and distributing software, don't rationalize and don't launch arguments about gray areas. Even 10-year-olds know software piracy when they see it.
- If a 10-year-old gives you a computer tip, take it. ■

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